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AN ECOLOGICAL APPROACH TO PREDICTING FIRST GRADE STUDENT ACHIEVEMENT

BY

GENEVIEVE MARIE JOHNSON-FEDORUK

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"Until we can break free of the child-deficit or medical model in understanding, explaining and predicting academic performance, we will continue to fall short of our noble early identification aspirations". (Fedoruk, 1989, p. 42)

THE UNIVERSITY OF ALBERTA

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THE UNDERSIGNED CERTIFY THAT THEY HAVE READ, AND RECOMMEND TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH FOR ACCEPTANCE, A THESIS ENTITLED AN ECOLOGICAL APPROACH TO PREDICTING FIRST GRADE STUDENT ACHIEVEMENT SUBMITTED BY GENEVIEVE MARIE JOHNSON-FEDORUK IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

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Dedication

To my first born.

Rani. I'm finally finished studying. I have time to play Monopoly with you now. Rani. I can read you Pinocchio now. Really. I'm all finished studying. Where're those things you wanted me to put in your hair? Rani . . . Rani . . .

ABSTRACT

Traditional kindergarten screening instruments have not been able to predict first grade student performance with a satisfactory degree of accuracy. Predictive error may be the consequence of faulty or excessively simplistic child-deficit conceptualizations upon which conventional screening has generally been based. An alternate paradigm, an ecological orientation, is proposed as more appropriate for dealing with educational phenomena. Ecological theory maintains that school failure and learning problems are the result of incompatibility or incongruence between student characteristics and environmental requirements. While the current investigation lacked precedent, it was reasoned that predicting student achievement on the basis of ecological assumptions must involve predicting the congruence between students and their school environments. It was further reasoned that the classroom teacher is likely the most significant and consequential aspect of a young child's school environment.

In an attempt to improve the accuracy with which first grade student achievement can be predicted from a kindergarten population, several steps or stages of data collection and analyses occurred. First, a q-sort procedure for profiling both teachers and students in terms of a wide number of descriptive characteristics was developed and refined. Second, profiles of kindergarten students were established in relation to the previously refined descriptors. Third, first grade teachers who received these students were profiled in terms of their interpretation of the same descriptive student characteristics. Fourth, when these students had completed first grade, several measures of their achievement were obtained. Finally, a number of metrics or indices of the congruence, fit, or compatibility between student profiles and teacher profiles were developed.

These Ecological Congruence Metrics were validated in terms of predictive hit rates and correlations to measures of student achievement. It was found that certain metrics could predict certain outcomes with considerable accuracy. Similarly, numerous significant correlations between metrics and various outcome criteria for varying sample groups and subgroups were found. These significant results appeared to carry several implications for educational practice, future research, and theory.

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CHAPTER 1

OVERVIEW AND INTRODUCTION

Screening kindergarten students in order to identify children at risk of first grade failure routinely occurs in most school systems (Lindsay & Wedell, 1982). The practice is based on several fundamental assumptions: 1) That some students lack the necessary prerequisite skills and competencies to succeed in first grade; 2) that these prerequisite abilities are known; 3) that they can be reliably and validly assessed; 4) and that having identified students who demonstrate such deficiencies, intervention which will serve to increase these youngsters' chances of success in first grade can and will occur. As commendable and optimistic as the goals of kindergarten screening may be, the fact remains that none of its fundamental assumptions are above controversy (Keogh & Daley, 1983). Indeed, there is little agreement regarding what specific skills and behaviors are critical prerequisites to satisfactory first grade performance (Horn & Packard, 1985; Swanson & Mason, 1984). Reliable assessment of these competencies, even when they can be agreed upon, is suspect to say the least (Badian, 1982; Salvia & Ysseldyke, 1981). What school boards do with kindergarten screening results, the intervention which may or may not follow, is not consistently nor clearly of benefit to the children in question (Wilson & Reichmuth, 1985). Given the current state of kindergarten screening, in fact, continuation of present practices is difficult to justify.

The predictive accuracy of traditional kindergarten screening is most generally reported to be approximately 75% (Badian, 1982). That is to say, the first grade achievement of 25 out of 100 kindergarten students is inaccurately predicted. Many children expected to experience failure in first grade may be unnecessarily held back in kindergarten. Conversely, many children promoted to first grade experience failure and frustration. Increased predictive accuracy of early learning and school failure is critical for both humanitarian and economic reasons. As far as possible, children should be protected from unrealistic academic and social demands which may lead to compounding secondary disabilities. Equally, grade retention and/or special education placement, if unnecessary and avoidable, place excessive strain on educational resources.

It may be by focusing on the approximate 25% of any kindergarten population who elude accurate prediction that we will gain insight into some of the variables which critically relate to presymptomatic identification of student failure. It may be, in fact, that narrowing research focus to kindergarten students whose first grade performance is uncertain will prove most efficacious. Indeed, it seems that administering a screening test to many kindergarten students is quite unnecessary. Most kindergarten teachers are very certain about the first grade performance of the majority of their pupils. It may be only a few students in any kindergarten class who truly require predictive assessment in order to determine their first grade performance. This comparatively small number of kindergarten students may constitute a large portion of the 25% of the kindergarten population who continually confound traditional educational screening. By reducing the scope of kindergarten screening, it may be possible to apply more elaborate and time consuming predictive procedures.

Part of the reason conventional screening has failed to accurately predict the first grade performance for some 25 out of 100 kindergarten students may rest in the origin and nature of educational screening. Screening refers to the practice of examining entire populations or segments of the population in order to identify those individuals harboring a certain condition. Widespread screening developed in response to medical concerns, primarily regarding infectious or contagious illness (Frankenburg, 1985). As educational screening evolved it copied or replicated the basic assumptions and practices associated with medical screening. That is, large groups of children were administered tests in order to determine the presence or absence of specific factors associated with certain conditions. However, the assumptions upon which medical screening are based may not be appropriately nor realistically generalized to educational concerns. A medical model focuses on very specific singular physical variable which are characteristically clear cut and quantifiable. Education, conversely, is concerned with multiple psychoeducational variables such as cognition, behavior, and academic readiness which are vague abstractions or hypothetical constructs. Indeed, the similarities between physical illness and school failure seem limited.

In understanding, explaining and predicting illness, a medical model assumes that disease or illness is specific to or belongs to an individual. In applying a medical framework to educational phenomena, learning problems and school failure are similarly conceptualized as the consequence of within-child variables, specifically, child deficits. Thus, a popular educational paradigm is that referred to as a child-deficit model. The underlying causes of learning difficulties are exclusively within-child deficiencies. A child-deficit model implies that students experience difficulty in school because they are unable to perform adequately in any of a number of areas. For example, children may demonstrate deficiencies in cognitive processes, in task orientation, in intellectual development, or in motoric skills.

A child-deficit approach assumes that all variance in first grade achievement can be accounted for by differences or deficiencies in students. However, many environmental factors such as class size, reading program, and teacher competence have been shown to affect student achievement (Jones & Jones, 1986). Thus, in trying to explain predictive inaccuracy and improve predictive accuracy of kindergarten screening, a child-deficit model may be particularly inappropriate. Instead, a paradigm which acknowledges the impact of both child and environment in accounting for and predicting variance in student achievement must be adopted.

When all possible sources of environmental variance in first grade are considered, the classroom teacher stands out as perhaps the single most significant factor. While uniformity exists in terms of physical classroom arrangements, curriculum, and materials, each first grade classroom is controlled by a different teacher. It is the teacher who interprets curriculum, provides feedback, supports, disciplines, selects materials, reinforces, monitors, interacts, and encourages. It is likely that first grade teachers vary considerably with respect to their personal goals, attitudes, preferences, requirements, tolerance, and biases. And it is equally likely that the dynamic, personal, and unique interactions which unfold between student and teacher account for at least some of the variance in pupil achievement. In predicting first grade student performance, then, a conceptual framework that can accommodate both student and teacher characteristics is required, a model which acknowledges the possibility that variations in student achievement are tied to variations in student-teacher compatibility.

A relatively recent educational paradigm, the ecological model, conceptualizes student performance as the consequence of child characteristics in relation to situational requirements (Apter & Conoley, 1984). In understanding and correcting student dysfunction, child characteristics and environmental variables are simultaneously addressed. Child attributes and environmental characteristics are only meaningful relative to each other and to examine one without reference to the other does not reveal the meaning or impact of either.

Thus student achievement cannot be predicted without some knowledge of the environments within which predictions are expected to be actualized. Conventional kindergarten screening has provided information regarding child characteristics, but has failed to provide the meaning of those characteristics in different first grade classrooms and for different first grade teachers. While an ecological paradigm has yet to be applied to presymptomatic identification of learning problems, theoretically such a model would provide an estimate of the extent to which child characteristics were compatible or appropriate relative to environmental expectancies and requirements. Fedoruk (1989) summarized the current state of kindergarten screening and hinted at the need for an ecological orientation in her "conceptually equivalent analogy".

> Consider your dismay if when presented with a seedling you were asked, "How well will this grow? Tell me, will it flourish or perish once planted?" You would no doubt glance at the young plant briefly and reply, "It seems generally intact and capable of growth but I cannot possibly predict its growth without some knowledge of the soil in which it will be planted, the amount of sunlight and water it will be given."
>
> "But can't you weigh it, analyze it, assess its dimensions and properties, look at it under a microscope, then tell me, how well will this seedling grow?"
>
> The situation in this analogy seems ridiculous. Even in this age of genetic engineering the growth and development of a young plant are contingent upon properties of its environment. Indeed, the growth and development of all living things are intimately related to external circumstances and conditions. No one would attempt to predict the growth of a seedling without firm knowledge of situational or ecological variables. And yet, in attempting to predict the first grade performance of kindergarten students, we examine child characteristics in

> excruciating detail with total disregard for situational, interactional or ecological variables; in absolute isolation from the contexts or environments in which we expect our predictions to be actualized.
>
> Examine these young children. Assess their IQ's. Measure their head circumferences. Can they discriminate, remember, attend, express themselves and follow classroom procedures? Are they left-handed, immature or uncoordinated? Compare them to a normative group, then tell me, how well will these children learn? (p 42)

The prediction of learning problems and school failure is a very worthwhile special education endeavor. Hit-rates of 75%, however, demand at the very least theoretical explanation. Adoption and application of a more appropriate conceptual foundation, consequently, may be necessary.

CHAPTER II

PREDICTING STUDENT PERFORMANCE: THE NEED FOR A NEW PARADIGM

Within the past two decades a great deal of educational thought and effort have been directed toward the early identification of children with learning handicaps (Badian, 1982; Banas & Wills, 1975; Barnes, 1982; Bricker, 1986; de Hirsch, Jansky, & Langford, 1966; Horn & O'Donnel, 1984; Lindquist, 1982; Satz, Taylor, Friel, & Fletcher, 1978; Silver, Hagin, & Beecher, 1978). In fact, Public Law 94-142, the Education of Handicapped Children Act passed by the United States congress in 1975, mandated that all children with learning impairments beyond three years of age be provided free and appropriate educational services (Horn & Packard, 1985). Based on attempts to maximize developmental outcomes, improve cost efficiency (Bricker, 1986), and reduce the possibility of secondary emotional disabilities frequently associated with learning problems (Black, 1974; Fincham, 1977; Jorm, 1983), developmental, health, and sensory screening routinely occur in medical and educational institutions (Frankenburg, Emde, & Sullivan, 1985). Indeed, some school systems are required by law to assess all children entering kindergarten for health, vision, hearing, language, and social/emotional development (Commonwealth of Massachusetts, 1974; New York State Education Department Office for Children with Handicapping Conditions, 1[illegible]2; Wendt, 1978).

While kindergarten screening in order to predict early school and learning problems is widespread and in some cases legislated, the practice is not without serious conceptual and methodological shortcomings (Adelman, 1978; Algozzine & Ysseldyke, 1986; Barnes, 1982; Keogh & Daley, 1983; Lichtenstein, 1982; Meisels, 1987; Salvia & Ysseldyke, 1981; Wilson & Reichmuth, 1985). To appreciate the current state and practice of kindergarten screening, examination of the origin and nature of screening, its relationship to the concept of risk, and its eventual application as a predictor of psychoeducational problems is necessary.

The Origin of Screening and the Concept of Risk

"Screening for health problems and handicapping conditions has been recommended as a preventive measure for more than 40 years" (Frankenburg, 1985, p. 3). Initially, screening began in underdeveloped countries as a means of identifying individuals who constituted a health hazard to the population at large, such as those harboring an infectious illness that if not controlled might spread. The practice of health screening extended to North America and other developed countries which screened large segments of the population in order to identify persons harboring tuberculosis and other infectious diseases.

Understood as the "presumptive identification of unrecognized disease or defects by the application of tests, examinations or other procedures that can be applied rapidly" (Kemper & Frankenburg, 1979, p.

12), screening has resulted in some very impressive primary and secondary preventive consequences (Lindsay & Wedell, 1982). The universal screening of neonates for phenylketonuria (PKU), for example, has largely averted the development of mental retardation due to deficiencies in the enzyme phenylalanine hydrozylase (Holtzman, Morales, Cunningham, & Wells, 1975; Westling, 1986). Similarly, the early detection and treatment of visual defects (Robb, 1977; Strangler, Huber, & Routh, 1980; van Dijk, 1983) and hearing impairments (Downs, 1977; Greenberg & Calderon, 1984; Horton, 1976; Northern & Downs, 1974; Pollack, 1971; Webster & Ellwood, 1985) have proven very advantageous in terms of normalizing development by maximizing sensory stimulation and minimizing associated compounding disabilities.

As with screening for medical conditions, it was reasoned that early identification of children who may experience school difficulties could similarly result in more efficacious presymptomatic intervention (Ballard, 1981; Dunleavy, Hansen, Szasz, & Baade, 1981; Gullo, Clements, & Robertson, 1984; Keogh, 1977; Keogh & Becker, 1973, Mercer, Algozzine, & Trifiletti, 1979; Satz & Fletcher, 1979; Satz et al., 1978; Wilson & Reichmuth, 1985). However, while the value and utility of screening for physiologically based diseases, conditions, and handicaps are difficult to dispute (Rossetti, 1986; Strangler et al., 1980; Westling, 1986), the similarities between physical illness and academic failure are not nearly so obvious. Within a medical framework, for example, the identification of disease is simply a matter of determining whether the singular cause of an illness is present (Sameroff, 1985). In contrast, singular causes of school failure seem the exception rather than the rule (Beers & Beers, 1980; Lipson & Wixson, 1986; McGlauchlen, 1984; Perry, Guidubaldi, & Kehle, 1979). As Silverman, Davidson and Weintraub (1979) maintained, "a child's educability in school encompasses a complex, multifacted process" (p. vi). Thus, while the practice of screening developed in response to specific, singular physical conditions, its generalization to complex, interactional, multivariable, multioutcome, multiprocess, dynamic, subjective and abstract educational phenomena may not have been appropriate.

The practice of screening and the concept of risk are practically and theoretically related (Gulliford, 1976; Frankenburg, 1985). When kindergarten populations are screened in order to identify children likely to experience early school failure, actually, the attempt is to detect students at-risk of developing subsequent learning problems. Since the condition hoped to be identified has not yet developed, we are hypothesizing rather than confirming (Keogh & Becker, 1973). Children who have not actually been exposed to a first grade program cannot truly be classified as first grade failures. Because of uncertainty regarding which kindergarten students will experience difficulty in first grade and which will not, the probability of failure is evaluated in terms of educational risk. The number and magnitude of educational risk factors associated with students become the bases for predictions regarding future school performance.

Traditional Educational Risk Factors

Kindergarten screening, that is, the identification of kindergarten students at-risk of subsequent school failure, has traditionally involved establishing the presence of, and/or measuring the extent of, a number of factors, characteristics, or variables associated with school and learning problems. Frequently, educational risk factors believed to be appropriately applied to kindergarten populations have correlated with academic performance and/or school functioning.

Linguistic Competence

Linguistic competence and educational success, particularly in learning to read, have often been found to correlate (Benton & Pearl, 1978; Day & Day, 1984; Mann, 1984; Warren-Leubecker, 1987). Correlations between tests of language abilities and early school performance as measured by a standardized achievement test are most generally reported in the .40 to .65 range (Dole, Harvey, & Feldman, 1985; Freebody & Rust, 1985; Horn & Packard, 1985; Mann & Liberman, 1984; Schmidt & Perino, 1985; Swanson & Mason, 1984). Because reading proficiency is associated with success in primary grades, and because learning to read is correlated with linguistic competence, deficits in speech and language skills are thought to place young children at-risk of early school failure (Jansky & de Hirsch, 1972; Rowe, 1981; Tyson, 1976). A kindergarten student who has difficulty expressing thoughts and understanding directions, who cannot comprehend and recall linguistic input, who demonstrates a limited vocabulary, or who has not yet mastered syntactic rules is thought to be more likely to experience failure in mastering first grade curricula than a child who is linguistically proficient (Badian, 1982; Brigance, 1982; Sippola, 1985; Vail, 1984).

Perceptual Processing

Although often dismissed as ineffective and unverifiable (Hammill, Goodman, & Wiederholt, 1974; Hammill & Larsen, 1974, 1978; Larsen, Parker, & Hammill, 1982; Mann & Phillips, 1971; Salvia & Ysseldyke, 1981), perceptual processes are also thought to relate to learning (Benton & Pearl, 1978; de Hirsch et al., 1966; Dumont, van Bon, & Hoekstra, 1976; Jansky & de Hirsch, 1972; Rowe, 1981; Satz et al., 1978). Not to be confused with more recent cognitive approaches (Das, 1983, 1985; Das, Kirby, & Jarman, 1975, 1979; Das, Snart, & Mulcahy, 1982), traditional cognitive or perceptual processes refer to the child's abilities in processing information, perceptual modalities, or pathways of learning (Lerner, 1981). It is reasoned that since auditory, visual, mnemonic, haptic, and motoric processes are prerequisite to academic achievement, deficiencies in such processes will result in school failure (Barsch, 1967; Frostig, Lefever, & Whittlesey, 1961; Kephart, 1971; Sippola, 1985). For example, in order to print a child must be able to discriminate visual stimuli, must have well developed fine motor control, and must be able to integrate visual-motor information. Consequently, in identifying kindergarten students at-risk of first grade failure, numerous perceptual and sensori-motor skills are thought to be predictively appropriate (Dukes & Buttery, 1982; Lesiak, 1984; McKay & Neale, 1985; Piersel & Kinsey, 1984; Simner, 1984, 1985; Wright & DeMers, 1982).

While such a perceptual or cognitive processes approach to understanding, identifying, and correcting learning problems has recently fallen into considerable disrepute (Jorm, 1983), elements of this orientation linger on in some factors correlated with school failure. While many studies report negligible correlations between indices of perceptual-motor abilities and measures of or related to academic achievement (Lesiak, 1984), correlations as high as .40 are not uncommon (Horn & Packard, 1985; Solan, Mozlin, & Rumpf, 1985; Wright & DeMers, 1982). Thus, it seems that something in perceptual-motor tests, or the way in which some children respond to them, does in some cases differentiate school success from school failure. Because of this relationship, deficiencies in perceptual processing are believed to increase a child's probability of encountering academic difficulties.

Learning and Social Behavior

The way in which kindergarten students behave has also been proposed as a factor related to early school performance (Chazan, 1976; Harper, Guidubaldi, & Kehle, 1978). Both social and learning behaviors are believed to be important in academic contexts (Salvia & Ysseldyke, 1981). Learning behavior refers to all behaviors necessary and conducive to learning. The manner in which students approach activities, their organization, motivation, interest and perseverance, for example, often emerge as factors related to school performance (Hightower, Work, Cowen, Lotyczewski, Spinell, Guare, & Rohrbeck, 1986; Rubenstein & Fisher, 1974; Solomon & Kendall, 1977). Children who are "able to begin and complete classroom tasks" and who are "attentive to classroom proceedings" (Kornblau, 1982, p. 172) may be more likely to succeed in first grade than students who are distractible, frequently off-task, and unmotivated.

Social behavior, on the other hand, is concerned with functioning smoothly in a social milieu. The manner in which children interact socially, their ability to follow classroom rules, and conform to behavioral requirements have been shown to be related to school performance (Chess, 1968; Gray, 1985; Harper et al., 1978; Martin, Nagle, & Paget, 1983). Children who are "considerate of others" and "well-accepted and liked by peers" (Kornblau, 1982, p. 172) will probably be more successful in first grade than children who are inconsiderate and unpopular.

Brophy and Evertson (1981) identified several variables related to social behavior. They found that teachers frequently describe ideal students as mature, helpful, well behaved, and popular. Children who deviate considerably from these ideal behavioral qualities could be considered at-risk of developing school difficulties. Thus, less than adequate social and/or learning behavior competencies are frequently considered traditional educational risk factors.

Intellectual/Cognitive Functioning

Beyond linguistic competencies, perceptual processes and behavior, overall intellectual functioning is often considered an important variable in early school success. Sattler (1974) reported correlations between the Wechsler Intelligence Scale for Children and measures of academic achievement to range from .14 to .81, with a median correlation of .61. In fact, the original purpose of intelligence testing was to identify children likely to experience school and learning problems (Salvia & Ysseldyke, 1981; Westling, 1986). Thus, children deficient in intellectual or cognitive abilities are considered at-risk for school and learning difficulties (Badian & Serwer, 1975; Gray, 1985; Gredler, 1978). Deficits in skills such as coordination, language, memory, discrimination, and sequencing, for example, are typically considered educational risk factors (Dole et al., 1985; Freebody & Rust, 1985; Funk et al., 1986; Gullo et al., 1984; Lesiak, 1984; Salvia & Ysseldyke, 1981; Schmidt & Perino, 1985; Swanson & Mason, 1984; Tollefson et al., 1985).

Medical/Health Factors

A child's general state of health and nutrition also contributes to risk status. Nutrition is related to physical and neurological growth which in turn is believed to influence development and learning (Birch, 1972; Martin, 1973; Winick, 1973; Worthington, Pipes, & Trahms, 1978). Thus, a child subject to inadequate nutrition would be considered more likely to experience learning difficulties than a well nourished child. Crow (1978) suggested that children who frequently appear fatigued and pale, who have rashes, wheeze and cough, or who complain of stomach aches should be considered at educational risk.

Children with a history of prenatal, perinatal or neonatal difficulty such as asphyxia, infections or seizures are also considered at-risk for learning problems (Bricker, 1986). Children whose birthweight was less than 1,500 grams, a condition frequently associated with prematurity, or who experienced some form of biological or medical insult during infancy have a higher percentage of neurological and developmental problems than full term, nontraumatized infants (Culbertson & Ferry, 1980; Rossetti, 1986; Siegel, 1985). Because neurology and development are related to learning, children who experienced early neurological and developmental problems are thought to be at-risk for subsequent learning difficulties.

Student Age

Perhaps the simplest and most widely used criterion for determining first grade risk is chronological age (Ames, 1967; Ames & Chase, 1974; Ames et al., 1972; Brenner & Scott, 1971; Davis, Trimble, & Vincent, 1980; DiPasquale, Moule, & Flewelling, 1980; Fedoruk, 1988a; Frick, 1986; Gray, 1985; Halliwell & Stein, 1974; McGlauchlen, 1984; Moore, Moore, Willey, Moore, & Kordenbrock, 1979; Uphoff & Gilmore, 1986). The prerequisite skills and competencies which constitute school readiness are believed to be related to development and maturation (de Hirsch et al., 1966; Moore et al., 1979; Uphoff & Gilmore, 1986). Children who are young relative to classmates, whose birthdays are just prior to the entrance cut-off date, are thought to be at-risk of first grade failure due to lack of developmental maturity.

It seems obvious that a 5 1/2 year old child should not be expected to perform cognitively, intellectually, motorically, and behaviorally as well as a 6 1/2 year old child. Even though it is logical to assume that younger students should not be able to master an absolute level of skill acquisition established for older pupils, chronological age does not consistently differentiate the ready from the nonready (DiPasquale et al., 1980; Fedoruk, 1988a; Wilson & Reichmuth, 1985), at least in terms of standardized test scores. When outcome variables such as grade retention or teachers ratings are used, however, younger students are at a more distinct educational disadvantage. This, however, may be more indicative of teacher expectations or attitudes than actual student ability (Fedoruk, 1988a; Pain, 1981).

Academic Readiness

Because being ready to learn is considered mandatory for educational success, children who exhibit inadequate readiness for first grade are believed to be at-risk of early school problems (Ballard, 1981; Barnes, 1982; Carver, 1986; Ilg & Ames, 1965, 1972; Gullo et al., 1984; Riley, 1986; Shepard & Smith, 1986; Uphoff & Gilmore, 1986). Readiness for school is understood as the developmental attainment of certain prerequisite subskills along with the cognitive and social maturity necessary to integrate these subskills into new and appropriate abilities (Brenner & Scott, 1971; Jensen, 1969; Salvia & Ysseldyke, 1981). The prerequisite skills generally associated with school readiness include linguistic competence (Steinbauer & Heller, 1978; Telegdy, 1974, 1975; Tyson, 1976; Vail, 1984), perceptual and sensori-motor processes (Banas & Wills, 1975; Brenner & Scott, 1971; Dumont et al., 1976; Kelly et al., 1973; Morency & Wepman, 1973; Solan et al., 1985; Wright & DeMers, 1982), appropriate school behaviors (Gray, 1985; Harper et al., 1978), and adequate intellectual abilities (Ames, 1977; Barnes, 1982). Thus, most traditional educational risk factors are subsumed within the construct of academic readiness.

Very specific preacademic skills such as knowledge of alphabet and colors, the ability to print first name, identify geometric shapes, and count from one to ten are frequently associated with success in first grade (Badian, 1982; Barbe, Milone, Lucas, & Humphrey, 1980; Barbe & Shields, 1976; Brigance, 1982; Chew & Morris, 1984). Consequently, student inabilities or deficiencies regarding any of these specific preacademic tasks are thought of as educational risk factors (Boehnlein, 1987; Stewart, 1985).

Since curricula are hierarchical with each grade providing necessary prerequisites for the next, kindergarten objectives would logically provide some indication of the skills considered necessary for success in first grade, - that is, competencies associated with first grade readiness. According to Alberta Education (1984), kindergarten contributes toward the development of student self-concept, gross motor, fine motor and perceptual motor skills, emotional, social and moral growth, thinking processes, language and creativity. Thus, it seems that the Alberta Ministry of Education conceptualizes first grade readiness in generally the same terms as do educational theorists and researchers. A child will be ready for first grade once linguistic, perceptual, motoric, intellectual, and behavioral competencies are sufficiently developed. A child who is not ready for first grade in terms of these competencies is believed to be at increased educational risk.

Unconventional Educational Risk Factors

While traditional educational risk factors such as linguistic, perceptual, and cognitive deficiencies, behavioral, medical, health and readiness inadequacies, and relative age are most commonly associated with kindergarten screening and the presymptomatic identification of school and learning problems, it may be that a number of other student characteristics indirectly place children at-risk. It could be argued that any and all student attributes related, however indirectly, to student academic problems and inadequate school functioning should be considered risk factors. Perhaps because these types of student attributes are not generally amenable to educational intervention, characteristics such as ethnicity, socioeconomic status, familial dynamics, gender, personality and physical appearance, they are rarely addressed in kindergarten screening. Because of this and because such student characteristics are related to academic achievement, they could be referred to as unconventional educational risk factors.

Student Ethnicity/Race

Student ethnicity and race have frequently been found to affect teacher-student interactions (Aaron & Powell, 1982; Brophy, 1983; Brophy & Good, 1974; Cooper & Good, 1983; Cornbleth & Korth, 1980; Feldman & Saletsky, 1986; Haller, 1985; Irvine, 1986). While some effort to improve the situation has occurred, racial and cultural minorities are often overrepresented in special education programs (National Coalition of Advocates for Students, 1986; Westling, 1986). The personal, social, and institutional dynamics which render minority groups at an educational disadvantage are not always clear. What is clear, however, is that student ethnicity appears to have some relationship to teacher expectations, teacher-student interactions, and student school performance. Since this is the case, certain student racial or ethnic characteristics could be construed as educational risk factors.

Student Socioeconomic Status

Student socioeconomic status (SES) has frequently been implicated in early school achievement (Bricker, 1986; Evans, 1987; Good, Biddle, & Brophy, 1975; Gray, 1985; Mills, 1983; National Coalition of Advocates for Students, 1986; Rist, 1975; Westling, 1986). As illustrated by the philosophy of Operation Head Start (Maxim, 1980), children from extremely low socioeconomic families are believed to be at increased risk of experiencing academic difficulties. Due to lack of sensory and linguistic stimulation, inadequate nutrition, limited exposure to books and inappropriate parent models, children from low socioeconomic backgrounds frequently appear to be at a distinct academic disadvantage. In fact, father's income has been proposed as the best predictor of student academic achievement (Kellmer-Pringle, Butler, & Davie, 1967; Malmquist, 1958).

Familial Structure and Interaction

Some educational theorists have suggested that students' familial structure and dynamics are related to teacher perceptions and school performance (Bowley, 1975; Crow, 1978; Guthrie, 1983; Markman & Jones-Leonard, 1985; Snow, 1983). Because the family is considered critical in terms of cognitive, social and emotional development, a family that is not intact or that is not functioning smoothly is more likely to produce children who experience school and learning problems (Emery, 1982; van Doorninck, 1977). If this assumption is accepted, certain familial structure and interactive variables could be considered educational risk factors.

Student Gender

Whether a student is male or female appears to influence teacher expectations, teacher-student interactions, and achievement in certain school subjects (Evans, 1987; Gray, 1985; Irvine, 1986; Kedar-Voivodas, 1983; May & Welch, 1984; Sadker & Sadker, 1986; Simpson & Erickson, 1983; Wilkinson & Marrett, 1985). While females are discriminated against in certain respects, males are of particular concern since a disproportionate number of boys require special education intervention (Westling, 1986; Winzer, Rogow, & David, 1987). Although the cultural, maturational, and social dynamics are unclear, boys often appear at an educational disadvantage in primary school (Ames, 1967, 1977; Ames, Gillespie, & Streff, 1972; Ilg & Ames, 1965, 1972). Since this is the case, student gender could be considered an educational risk factor.

Student Personality

Student personality characteristics appear to affect classroom interactions and school achievement (Barbe et al., 1980; Brophy & Evertson, 1981; Brophy & Good, 1974; Fedoruk, 1988b; Handley, 1973; Mevarech, 1985). This relationship justified a few researchers to attempt to predict early school performances on the basis of certain aspects and measures of student personality (Glutting & Nester, 1986;

Hall & Keogh, 1978, Lambert & Windmiller, 1977). While student personality variables were in general able to account for no more than 20% of the variance in student achievement, these studies did suggest that student personality has at least a little predictive utility.

In ~~summarizing~~ several studies related to student personality, Brophy and Good (1974) concluded "that teachers tend to prefer compliant and cooperative children and to reject assertive and active children" (p. 164). The Zaner-Bloser Kindergarten Check List appears to support this position and adds that personality variables such as "shares personal experiences", "has a positive attitude toward self" and "has a positive attitude toward school and learning" are related to first grade readiness and subsequent school performance (Barbe et al., 1980, pp. 9-10). Unlike Brophy and Good, Kornblau (1982) identified extroverted and outgoing as ideal pupil characteristics. Thus, although it is unclear which student personality variables are deficits and which are not, there appears to be some consensus that student personality influences achievement. Since certain personality characteristics may affect student school functioning, it could be said that those personality characteristics are educational risk factors.

Student Physical Appearance

Physical attractiveness has been found to affect teacher expectations about students (Brophy & Good, 1974; Clifford & Walster, 1975; Dion, Berscheid, & Walster, 1972). Similarly, student physical characteristics such as size, neatness, and health have been found to correlate with teacher expectations of student success (Brophy & Good, 1974). Since physical characteristics influence teacher expectations, and since teacher expectations influence actual student achievement, it reasonably follows that certain student physical characteristics should have some predictive potential. A child who is small, sickly-looking, and/or unkempt, for example, could be considered at increased risk of developing interactive and/or school problems.

Thus a number of conventional as well as unconventional educational risk factors exist. Traditional risk factors concerned with linguistic competence, perceptual and motor development, behavior, cognition, health, age and academic readiness have, in general, a stronger relationship to student achievement than unconventional risk factors. However, unconventional risk factors such as ethnicity, SES, familial dynamics, gender, personality, and physical characteristics have, to varying degrees, a relationship to student academic and social performance. While the relationship may at times be indirect and tenuous, we nonetheless could construe these sorts of student attributes as factors which may increase children's risk of encountering school problems.

An important issue which has yet to be addressed is conceptual definition of the risk children face. Risk has been discussed at some length, but exactly what these children are at risk for has yet to be specified.

At-Risk For What?

While the concept of risk and the practice of attempting to identify children at-risk are fundamental to special education (Bricker, 1986; Keogh & Daley, 1983; Lindsay & Wedell, 1982; Rowe, 1981), it is unclear exactly for what such children are at-risk. School problems and learning difficulties are generally conceptualized as if some absolute, operational criteria exist. However, there does not appear to be overwhelming conceptual agreement regarding the specific risk kindergarten children face (Wilson & Reichmuth, 1985). School failure and school success are rather vague, subjective, and varying terms.

Since many predictive studies use a standardized achievement test as criterion or outcome variable (Dole et al., 1985; Funk, Sturner, & Green, 1986; Solan et al., 1985; Wright & DeMers, 1982), school problems could be defined as less than average performance on standardized instruments. In this case, 50% of any first grade population would be school failures. Thus, half of any kindergarten class would be at educational risk. Perhaps all children in the low reading group could be classified as learning problems. Thus, one third of first grade children could be considered failures and one third of every kindergarten class would be at-risk. Perhaps school failure means grade retention. In that case, there are very few first grade learning problems and very few kindergarten children at-risk. It may be that the need for remedial intervention indicates school failure. Since remediation apparently corrects learning problems, does failure exist only when remediation is unsuccessful? Does risk constitute requiring remediation or not responding to remediation? What if no remedial option exists? Are there no school failures and no children at-risk? What if parents refuse to have their children repeat first grade? Are these children, then, not school failures? Clearly, judgements of what constitute school failure are difficult to define.

In the case of academic achievement, is school success relative to a specific critical level or is it relative to potential? We speak of each child realizing full academic potential (Ames, Gillespie, & Streff, 1972; McIlroy, 1979; Purkey & Novak, 1984). In using standardized tests, however, children are evaluated not relative to potential but relative to a normative sample. Are children at risk of not realizing their fullest academic potential? If this is the case, almost every child would be a school failure. Surely most children could perform at least a little better in first grade. Is a child with an IQ of 130 who realizes average achievement an educational failure? Is a child with an IQ of 80 who performs just below average an educational success? While lip service to individual differences is paid and the claim made that every child should "learn successfully and happily at his own level of performance" (Ames et al., 1972, p. 4), school success and failure appear most frequently defined in terms of some absolute standard or criterion (Horn & Packard, 1985; Salvia & Ysseldyke, 1981; Schmidt & Perino, 1985).

Is academic achievement the only metric of school success and failure? As Ames and her colleagues suggested, trouble in school assumes many different guises;

> Some parents consider it trouble if their child gets Bs instead of As, or Cs instead of Bs. Others don't worry about grades but do worry if a child behaves so badly that teacher or principal complains. Still others worry less about grades and school behavior than that their boy or girl dislikes school, is miserable or mopey, overfatigued, or even ill as a result of the school's demands. (1972, p. 9)

It seems, then, that academic achievement is only one measure of school success. An emotional or affective component is also important. Students should feel happy and satisfied with the school experience. Similarly, parents should feel that school is a pleasant experience for their children. Thus, self-concept, social interactions, personal fulfillment, and parental satisfaction are all related to judgements of school success. Arguing against narrow outcome measures in evaluating the long-term effects of early intervention programs, Lazar and Darlington (1982) employed several measures of school competence, children's attitudes and values, and impact on the family. In defining student achievement, multidimensional, triangulational outcome variables (Agnew & Pyke, 1987) may be the most appropriate.

Defining first grade success and failure, and determining how that definition of success and failure will be evaluated, appear critically related to predictive accuracy. The criterion or outcome variables a researcher chooses may serve to increase or decrease predictor strength. If, for example, a cognitive index of first grade readiness is used, its relationship to a cognitive outcome as opposed to an emotional or social outcome will likely be greater. In screening kindergarten children in order to predict first grade success and failure, in fact, the instruments and devices used are sometimes related to seemingly arbitrary narrow outcome variables. Regardless of the way in which school failure is conceptualized or the outcome variables measured, identifying kindergarten students at-risk of first grade difficulties has taken only a few rather specific forms. The traditional assessment of risk and readiness, therefore, requires consideration.

Kindergarten Screening: Assessment of Selective Educational Risk Factors

Traditionally, identifying kindergarten students who are at-risk for some type of early school difficulties has involved administering any of a variety of readiness assessment techniques and devices (Barnes, 1982; Brennan, 1985; Salvia & Ysseldyke, 1981; Schmidt & Perino, 1985). Based on the assumption that positive corrective measures for readiness deficiencies can and will occur (Dunleavy et al., 1981; Gettinger, 1986; Hawkins, 1985; Keogh, 1977; Keogh & Smith, 1970; Mercer et al., 1979; Wolfendale, 1976), kindergarten students are routinely screened in order to determine their risk or readiness for first grade (Badian & Serwer, 1975; Lindsay & Wedell, 1982; Maitland, Nadeau, & Nadeau, 1974). While conceptual and format differences are apparent (Gullo et al., 1984), all kindergarten screening and readiness assessment devices claim to evaluate some skill or group of skills which have a relationship to subsequent school performance.

The Metropolitan Readiness Test (MRT, Nurss & McGauvran, 1976), for example, is reportedly the most widely used test of first grade readiness (Gullo et al., 1984; Maitland et al., 1974). Predictive validity for the MRT has generally been achieved by correlating its scores with scores on first grade standardized achievement tests, frequently the Metropolitan Achievement Test (MAT). While significant correlations have been found (Bolig & Fletcher, 1973; Lorton, 1977; Randel, Fry, & Ralls, 1977; Telegdy, 1975), the MRT creators themselves reported highly significant predictive correlations, from .65 to .78 (Nurss & McGauvran, 1976). This may be the consequence of the outcome variable's (MAT scores) similarity to the predictor variable (MRT scores). Regardless, the predictive utility of the MRT is considered so superior relative to other readiness assessment tests that it has often been used as a standard against which alternate screening measures are validated (Chew & Morris, 1984; Hayes, Mason, & Covert, 1975; Obrzut, Bolocofsky, Heath, & Jones, 1981; Tsushima, Onorato, Okumura, & Sue, 1983). While such correlations may be technically impressive, one begins to wonder about the value of a screening test with a high correlation to a readiness test that has a high correlation to a very similar achievement test.

Less popular than the MRT, a host of test batteries as well as specific readiness indices have been theoretically and sometimes practically endorsed, and to varying degrees found to predict first grade student performance. Correlations are always between a traditional educational risk factor or readiness task (predictor variable) and either another measure of readiness or a standardized achievement test (criterion variable). Correlations range from negligible to very high, with correlations of .40 to .70 perhaps the most common. To illustrate, a test of listening comprehension was found to correlate .62 with the Boehm Test of Basic Concepts (Dole et al., 1985). Subtests of the McCarthy Scales of Children's Abilities correlated from .35 to .65 with the California Achievement Test (Funk et al., 1986). Two tests of visual-motor coordination correlated from .17 to .22 with subtests of the Wide Range Achievement Test (Wright & DeMers, 1982). The Lollipop Test correlated .76 with the MRT (Chew & Morris, 1984). The Screening Test of Academic Readiness correlated .71 with the Peabody Individual Achievement Test (Nichta, Federici, & Schuerger, 1982). Numerous specific perceptual tasks were found to correlate from .34 to .53 with the Science Research Association Primary Mental Abilities Test - Readiness Level (Solan et al., 1985). This type of research with these sorts of results is very common. While more and more predictive indices are developed and to varying extents validated, the fact remains that the best predictor variables claim predictive accuracy in the 70% to 80% range (Badian, 1982; Keogh & Daley, 1983; Lichtenstein, 1982; Lindsay & Wedell, 1982).

As well as readiness tests and empirically validated predictive indicators, kindergarten teachers' subjective evaluations are often employed as predictors of subsequent student success (de Hirsch et al., 1966; Keogh & Smith, 1970; Lindsay & Wedell, 1982). Based on personal experience and extensive direct observation, kindergarten teachers are able to evaluate the quality of student behavior and performance. Students who are not ready to begin first grade will likely be identified by kindergarten teachers without reliance on standardized readiness tests. As Feshbach, Adelman and Fuller (1974) concluded, "a kindergarten teacher's ratings can predict first grade reading achievement at least as efficiently as a psychometric battery that has been designed for that purpose" (p. 54). Correlations between teacher estimates and actual student performance have been reported as high as .72 (Doherty & Conolly, 1985), - about as high as the best predictive tests and indices.

It seems, then, that kindergarten screening for first grade risk and readiness relies on a limited number of technologies. Standardized readiness tests, empirically validated correlates, and teacher ratings, with varying degrees of accuracy, have all been found to predict certain first grade outcomes, most frequently standardized achievement test scores. All readiness devices and kindergarten screening techniques, it should be noted, are obvious in their commitment to a child-deficit model. That is to say, regardless of the specific variables being assessed or the format used, all indications of subsequent success or failure are believed to be in the child. It is by uncovering deficiencies within the kindergarten student that potential first grade failures are identified. It is variables within the child and only variables within the child that account for differences in achievement.

Having considered both conventional and unconventional educational risk factors, varying conceptualizations of success and failure, and the way in which first grade risk and readiness are assessed, the task now becomes one of more specifically examining the predictive accuracy of traditional kindergarten screening practices.

The Accuracy of Kindergarten Screening

As previously mentioned, predictive validity coefficients or correlations are frequently used to specify the strength of the relationship between predictor variable and criterion or outcome variable. While such validity coefficients may be important in evaluating the technical quality of screening instruments, the essential question of decision or prediction accuracy is not addressed. In evaluating the accuracy of kindergarten readiness screening tests, instead of validity coefficients, predictive hit rate is sometimes used because it directs attention specifically at the number of accurate versus inaccurate predictions. Based on the prediction-performance matrix, errors of over, under and correct identification are expressed as percentages.

Thus, as illustrated by Figure 1, the prediction performance matrix yields five indices of predictive accuracy: 1) the number of students designated as at-risk whose subsequent achievement is inadequate (true positives); 2) the number of students identified as ready to begin first grade whose subsequent achievement is adequate (true negatives); 3) the number of students designated as at-risk whose subsequent achievement is adequate (false positives); 4) the number of students identified as ready whose subsequent achievement is inadequate (false negatives); and 5) the overall hit rate calculated by the number of true positives and true negatives divided by the total number screened (Wilson & Reichmuth, 1985). Figure 2, for example, represents a fairly typical distribution of scores on the prediction-performance matrix for a kindergarten screening or readiness test.

	Inadequate Achievement	Adequate Achievement
At-Risk	True Positive	False Positive
Ready	False Negative	True Negative

Figure 1: Prediction-Performance Matrix

	Inadequate Achievement	Adequate Achievement
At-Risk	5 True Positive	13 False Positive
Ready	12 False Negative	70 True Negative

Figure 2: Typical Distribution of Scores for a Kindergarten Screening Test on the Prediction-Performance Matrix

This hypothetical data illustrates that out of 100 kindergarten children screened in order to predict first grade performance; 1) five identified as at-risk did in fact experience subsequent learning difficulties; 2) 70 predicted to achieve adequately in first grade did realize satisfactory achievement; 3) 13 designated at-risk did not experience learning problems; and 4) 12 expected to perform adequately in first grade actually demonstrated unacceptable achievement. Thus, the overall hit rate would be 5 true positives plus 70 true negatives divided by the total sample results in 75% of the predictions being accurate. In fact, the most predictively accurate kindergarten screening devices frequently report overall hit rates in this range (Badian, 1982; Keogh & Daley, 1983; Lichtenstein, 1982; Lindsay & Wedell, 1982). The percentages of false positives, false negatives, true positives and true negatives are generally consistent with the hypothetical data presented in Figure 2 (Doherty & Conolly, 1985;

Dunleavy et al., 1981; Keogh & Daley, 1983; Simner, 1985; Wilson & Reichmuth, 1985; Uphoff & Gilmore, 1986).

The actual consequences of errors of overidentification (false positives) and underidentification (false negatives) to children specifically and the educational system generally are serious. Overidentified kindergarten children, some 13%, are at best mislabeled and at worst misplaced. Being labeled at-risk when no risk exists can have negative repercussions in terms of teacher expectancy. Being retained in kindergarten unnecessarily places excessive demands on children and on educational resources. An additional, though unnecessary, year of kindergarten costs the entire educational system. Conversely, underidentified children, some 12%, who may have benefitted from kindergarten retention, transition class placement, or presymptomatic remediation may not be identified. Such children could be placed in learning environments for which they are unprepared. Subsequent intervention may prove less effective due to confounding secondary disabilities. Some children may be subjected to failure and frustration that could have been avoided given more sensitive and accurate predictive indices.

Thus, errors of over and underidentification are difficult to accept on both humanitarian and economic grounds. In fact, it has been suggested that the overall accuracy of kindergarten screening in order to identify first grade failures does not support the continuation of such practices (Adelman, 1978). Barnes (1982) cautioned that the quality of most kindergarten screening programs "leaves much to be desired and in some cases there is little or no evidence on their effectiveness" (p. 6). Due to serious conceptual and methodological limitations (Lichtenstein, 1981, 1982; Salvia & Ysseldyke, 1981; Wilson & Reichmuth, 1985), errors of overidentification and underidentification are entirely too common (Dunleavy et al., 1981; Mercer et al., 1979; Satz & Fletcher, 1979; Uphoff & Gilmore, 1986).

It is interesting to consider the reasons traditional kindergarten screening has not consistently accurately predicted first grade student achievement. Why do some kindergarten children, who appear to possess adequate prerequisite readiness skills, go on to experience difficulties in first grade? Why are other children, who seem unprepared for school, able to adapt and function successfully in first grade? As Fedoruk and Norman (in press a) concluded;

> ... one explanation for at least some of the predictive errors of over and underidentification of conventional kindergarten screening may rest in the differential nature with which first grade teachers react to, evaluate, and interpret predictive student-characteristics.

Indeed, it has been suggested that all conventional kindergarten predictive investigations "have been restricted to procedures which do not assess the impact of many key variables which interact in shaping school success and failure" (Adelman & Feshbach, 1971, p. 349). This may be the consequence of the conceptual model or foundation upon which such investigations have exclusively been based.

A Child-Deficit or Disease Model

As previously mentioned, screening developed within a medical or disease model (Sameroff, 1985) and was later generalized to education (Lindsay & Wedell, 1982). Applying a medical model to educational concerns resulted in learning problems being conceptually equivalent to physical disease or illness. Just as disease is understood as the exclusive property of the infected individual, so too learning problems are conceptualized as the exclusive property of the student. A person has tuberculosis; it is his/her condition, specific to his/her body. Similarly, learning difficulties belong to students and are the consequence of personal student inadequacies. Thus, mental retardation is equivalent to child deficiencies in overall intellectual capacities (Westling, 1986; Winzer et al., 1987) and learning disabilities are manifestations of child deficiencies in specific cognitive processes (Das, 1983, 1985; Das et al., 1975, 1979, 1982).

If the educational risk factors previously reviewed are reconsidered, it seems quite clear that conceptualizations of risk are consistent with a child-deficit model. Conventional educational risk factors, for example, exclusively address deficiencies or inadequacies that are assumed to reside within students. Language, perception, and cognition, to illustrate, are aspects or manifestations of cerebral or neurological functioning. While environmental experiences may influence a child's competencies with language, perception, and cognition, concern with the environment is restricted to its subsequent impact on child attributes and levels of functioning.

This also appears to be the case with unconventional risk factors. SES, for example, is related to student academic achievement and thus indirectly an educational risk factor. An impoverished environment, however, is not conceptualized as a deficiency. Rather, the deficiency occurs within the student as a consequence of poverty. Inadequate stimulation and exposure, frequently associated with low SES families, causes within-child cognitive deficiencies. Even environmental risk factors, consequently, are consistent with a child-deficit orientation to school dysfunction and failure.

The Appropriateness of a Child-Deficit Model

A critical question related to the predictive accuracy of kindergarten screening is concerned with the appropriateness of a child-deficit model. Can it reasonably be assumed that school failure and learning problems are exclusively the consequence of within-child deficits? Some educational researchers and theorists have questioned the appropriateness of a child-deficit model in relation to kindergarten screening (Adelman & Feshbach, 1971; Faust, 1970; Keogh & Daley, 1983) and early identification generally (Bricker, 1986; Stukat, 1979; Sumner, 1979). While such an orientation may be appropriate relative to medical concerns, although some physicians are beginning to question their most basic assumptions (Kaplan & Newhouse, 1984; O'Banion, 1981; Stock, Santamaria, Marian, & Gorini, 1976), a child-deficit model has been criticized as incompatible with the dynamic nature of education and schooling (Adelman, 1971; Apter, 1977, 1982; Apter & Conoley, 1984; Faust, 1970; Golby & Gulliver, 1985; MacIntyre, Keeton, & Agard, 1980). As Silverman and his colleagues (1979) suggested;

> To assume that the reasons for a child's learning disabilities are tied only to inner deficiencies is unrealistic; the dynamics of interaction between the child and the learning situation accounts for a substantial number of school learning problems ... (p. vi)

In attempting to identify kindergarten students at-risk of first grade difficulties, however, the interaction between child and learning environment has almost completely been ignored. Clearly, individuals are affected by the contexts in which they must function (Funder & Ozer, 1983; Magnuson & Endler, 1977). In accounting for the significant number of predictive errors of over and underidentification, it may be that the interaction between child characteristics and environmental variables which in turn impacts upon school performance has not been sufficiently acknowledged. The child-deficit or disease model, upon which kindergarten screening efforts have exclusively been based, may be a serious oversimplification of the nature of learning, the dynamics of classroom interactions, and the variables which affect school achievement. While kindergarten screening tests provide information about characteristics of the child, they give no information about the classroom environments in which those characteristics will be evaluated, interpreted, and expected to harmonize. Kindergarten screening, it seems, provides information regarding only one facet of a complex interactional equation. As Faust (1970) concluded; the "greatest hope for the identification of potential learning problems is to abandon the belief that they are inherent, stable traits of the individual" (p. 345).

If the belief that learning problems are solely the consequence of within student characteristics is abandoned, the question becomes "of what are learning problems the consequence?" It could be hypothesized that student success and failure are the result of interactions between the child and the learning environment. If this is true, the impact of actual and/or imputed student characteristics on individual teachers becomes a predictive concern. When attempting to predict student achievement, it may be necessary to take into account teachers' preferences, desires, expectancies, biases, requirements, and even idiosycratic demands. The construct of student teachability focuses on teacher preferences in relation to student characteristics and therefore represents divergence from a strictly child-deficit orientation.

Student Teachability

Research on student teachability and ideal student attributes may be initial steps toward conceptualizing pupil success and failure as related to environmental variations. While the term is somewhat imprecise, student teachability has been used to refer to teachers' "a priori views about the attributes of model pupils" (Keogh, 1982, p. 276). Teachability is concerned with "teachers' views of pupils' amenability to instruction, their willingness to put forth effort, their attributes, and their likelihood of success in school" (Keogh, 1983, p. 43). Kornblau and Keogh (1980) suggested that "teachers' conceptions of teachability serve as a standard or model against which attributes of individual children are compared" (p. 88). Based on variations in professional experience, personality, intuition and training, teachers often form somewhat unique and individualized notions regarding what constitutes a teachable student (Thelen, 1967). Teacher-specific definitions of teachability may be one of the factors that interact with student characteristics to determine school performance. If student characteristics are appropriate relative to concepts of teachability, success may likely occur. On the other hand, if student attributes are inappropriate relative to notions of teachability, failure may more probably result.

Kornblau (1982) developed the Teachable Pupil Survey (TPS), a technique for assessing "teachers' perceptions of the characteristics of 'idealized teachable' pupils" (p. 173). Based on 33 most frequently occurring descriptors, three primary dimensions or factors associated with teachability were isolated. Factor I, Cognitive-Motivational Behavior, was concerned with student characteristics such as intelligence, curiosity, imagination and verbal ability. Factor II, School-Appropriate Behavior, involved pupil qualities such as attention span, ability to follow directions, willingness to participate and ability to complete classroom tasks. Personal-Social Behavior, Factor III, entailed attributes such as emotional stability, social adjustment, friendliness, confidence, and consideration. As can be seen from the factors and descriptors associated with teachability, cognitive characteristics represent merely one aspect of what teachers select as desirable and necessary student qualities. In fact, many of the TPS student descriptors appear to coincide with the previously reviewed unconventional educational risk factors.

While the concept of teachability serves to shift attention from exclusive focus on child characteristics to teacher interpretations of child characteristics and as such represents divergence from an exclusive child-deficit orientation, Kornblau's (1982) TPS does not address the possibility that varying definitions of teachability may differentially interact with pupil attributes. Because Kornblau was concerned with identifying consistency in terms of ideal student characteristics, TPS format does not permit specification of those student characteristics which cause a teacher to develop a negative teaching attitude toward a student, or at what point away from ideal pupil characteristics teacher behavior toward a student changes. Thus, while it seems that teachers' views may affect student achievement, it is not clear exactly when and for which students those views become critical.

Student Temperament

Research on student temperament represents further rejection of a total child-deficit approach to conceptualizing pupil dysfunction. It has frequently been suggested that student temperament is a non-cognitive factor which influences school achievement, teacher perception, and classroom interactions (Carey, 1981; Carey, Fox, & McDevitt, 1977; Chess, 1968; Fedoruk, 1988b; Gordon, 1981; Keogh, 1983; Keogh & Pullis, 1980; Klein, 1982; Lambert & Windmiller, 1977; Lerner, 1984; Lerner, Lerner, & Zabski, 1985; Martin et al., 1983; Mevarech, 1985; Paget, Nagle, & Martin, 1984; Paisey & Paisey, 1982; Palermo, 1982; Pullis, 1979, 1985; Pullis & Cadwell, 1982; Thomas & Chess, 1977). Keogh (1982) emphasized "that a number of individual differences are important in children's educational performance" and that temperament is one of the variables which has "a significant impact on children's achievement and adjustment in educational settings" (pp. 269-270). The temperamental predispositions children bring to personal-social transactions influence those transactions and intensify or reduce potential problems (Carey, 1981; Gordon, 1981; Keogh, 1983; Keogh & Pullis, 1980; Lerner, 1984; Lerner et al., 1985; Thomas & Chess, 1977). It reasonably follows that student temperament characteristics affect teachers' classroom management decisions (Pullis & Cadwell, 1982) and expectations of pupil educational performance (Keogh, 1982).

The pioneering research of Thomas and his associates (1968, 1977, 1980) implied that temperament characteristics are most meaningfully interpreted in relation to environmental specifications. That is, the educational consequences of certain student temperament predispositions are relative to classroom variations. Thus, identical student temperaments may result in very different educational outcomes given different classroom requirements. One teacher, able to tolerate certain pupil temperaments, may maintain high expectations and achieve productive patterns of interaction for students with those specific temperament characteristics. Another teacher, more sensitive to the same pupil temperaments, may develop low expectations for student success and correspondingly unproductive patterns of interaction. In this respect temperament is environmentally relative. Except in extreme cases student temperament is not clearly good or bad; rather, it is appropriate or less appropriate relative to environmental expectations.

In many respects temperament and teachability are conceptually related (Keogh, 1982, 1983). Behavioral style characteristics, to which the construct of temperament refers (Carey, 1981; Chess, 1968; Mevarech, 1985; Thomas & Chess, 1977, 1980; Thomas et al., 1968, 1970), may be some of the variables which contribute to students being judged as teachable, unteachable, or teachable to some degree. Thomas and Chess (1977) identified eight behavioral style dimensions in young school children: 1) Activity Level, 2) Adaptability, 3) Approach versus Withdrawal, 4) Distractibility, 5) Intensity of Response, 6) Persistence, 7) Quality of Mood, and 8) Threshold of Response. The way in which teachers regard these student temperament characteristics may influence conceptualizations of teachable versus less teachable children. For example, some teachers may feel quality of mood, a friendly, cooperative, good-natured disposition, is critically related to a student's classroom functioning and performance. On the other hand, some teachers may feel that a pupil's level of persistence is the essential variable which determines academic achievement.

Based on the Teacher Temperament Questionnaire (TTQ) developed by Thomas and Chess (1977), Keogh, Pullis, and Cadwell (1982) created an abbreviated 23-item form referred to as the Shortened Teacher Temperament Questionnaire (STTQ). The STTQ and the TTQ contain items which address all eight temperament dimensions identified by Thomas and Chess and both tests factor into three major descriptive categories. The first factor, Task-Orientation, involves the child's ability to remain on task until completion and to focus on the task at hand in spite of distracting stimuli. Personal-Social Flexibility, the second factor, is concerned with the child's ability to respond positively to new experiences, to modify behavior in response to changes in routine, and to react congenially to others. The third factor, Reactivity, refers to a student's tendency to overreact in stressful situations and become annoyed, upset, or argumentative when unable to acquire personal choices. Children, it seems, differ considerably along these three factors or dimensions (Chess, 1968; McDevitt & Carey, 1978; Thomas & Chess, 1977) and teachers, reportedly, react differently to children with various temperament dispositions (Fedoruk, 1988b; Klein, 1982; Lerner et al., 1985; Pullis, 1985; Pullis & Cadwell, 1982).

Temperament seems a relevant individual difference variable which influences student performance (Gordon, 1981; Martin, 1983; Palermo, 1982; Thomas, 1984). Both the TTQ and the STTQ, however, provide isolated information regarding student temperament. Because both questionnaires are completed by teachers, they report teacher perceptions and school-specific behavior as opposed, for example, to parent perceptions and at-home behavior. Thus, although the TTQ and the STTQ provide some insight into pupil temperament as perceived by teachers, they provide no information regarding teacher attitude, tolerance, interpretation, appreciation, and reaction toward specific behavioral style characteristics. Although Thomas and his associates (1968, 1977, 1980) maintained that temperament was related to environmental variations, the instruments developed to assess temperament have failed to incorporate this critical concept. Equally, while temperament is a move away from an exclusive child-deficit orientation to school problems, temperament dimensions are still clearly tied to student characteristics. While teachability to some degree and temperament to an even greater degree have begun to address the interaction between child and learning environment, it is ecological conceptualizations that absolutely represent student learning problems as the consequence of student-classroom and student-teacher interactions.

The Ecological Model

An ecological orientation represents pronounced rejection of a child-deficit conceptualization of student failure (Apter, 1977, 1982; Apter & Conoley, 1984; Evertson & Mehan, 1978; Gump, 1975, 1978; Hobbs, 1966, 1978, 1982; Mahoney & Weller, 1980; Paget & Nagle, 1986; Paster & Swap, 1978; Rhodes, 1967, 1970; Rhodes & Paul, 1978; Rogers-Warren & Wedel, 1980; Safran & Safran, 1986; Swap, 1974; Thomas & Marshall, 1977; Thurman, 1977; Whittaker, 1975). Originating as a biological science, ecology maintains "that in the struggle for existence all organisms constantly interact and adjust to an environment that includes other organisms as well as nonliving matter" (Wicker, 1984, p. 1). Ecological principles maintain that learning and behavior problems are not the exclusive property of the child, but rather, the result of child-environment interactions (Apter, 1982; Hobbs, 1975; Rhodes, 1967).

When environmental expectations and requirements are compatible with child characteristics, ecologists say the system is harmonious or balanced, and normal functioning or performance will occur. Conversely, when children and their ecosystems do not harmonize, when environmental requirements are incompatible with personal characteristics, individuals and their contexts are not balanced, resulting in conflict and dysfunction (Apter & Conoley, 1984). Apter (1982) referred to "specific places where there is a failure to match between the child and his or her ecosystem" as "points of discordance" (p. 58). To illustrate, if a first grade teacher expected active and enthusiastic student participation in class and a pupil was by nature temperamentally withdrawn and shy, that child would have difficulty satisfying teacher requirements. This mismatch or incompatibility between student personality and teacher preference could be referred to as a point of discordance in the child's ecosystem.

Since congruence and discordance are defined in terms of child-environment compatibility, ecologists believe that ideal student qualities and ideal classroom characteristics are relative to one another. Except in extreme cases, ideal student attributes are relative to specific environmental expectations and requirements. Thus, there is no such thing as a perfect student or a perfect classroom. Student characteristics can only be evaluated as more appropriate or less appropriate in terms of teacher preferences, requirements, and expectancies. Some teachers may favor orderly, cooperative, responsive, respectful, and good-natured students; others may prefer enthusiastic, verbal, energetic, and high-spirited pupils. The way in which different teachers respond to and evaluate the same child necessarily differs. While congruence may occur in one classroom, it may be less likely in another. In most cases it could not be said that a specific classroom teacher was superior to another; rather, all that could be said is that one environment is more appropriate relative to student characteristics.

Kornblau (1982) suggested that teachers do, in fact, express some consistency when selecting ideal student characteristics. Such selection of descriptors, however, does not indicate the range of student behaviors a teacher is willing to accept and the extent to which various student characteristics positively or negatively affect teacher attitudes toward students. While intelligent, attentive, emotionally stable, socially well-adjusted, and cooperative students would no doubt establish ecological congruence in most first grade classrooms, tolerance for less than ideal varies considerably from teacher to teacher (Apter & Conoley, 1984; Keogh, 1983; Soar, 1972). A child may establish and maintain ecosystem congruence with a very tolerant teacher while discordance may result with a less tolerant teacher. An important question, then, is at what point away from the ideal or expected, does teacher interactive behavior and evaluation of students become critical?

The ecological concept of "goodness-of-fit" (Paget et al., 1984) captures the essence of student-classroom and student-teacher compatibility. Thomas and his associates (1968, 1977, 1980) used "goodness versus poorness of fit" to explain how child-environment interactions result in either positive or negative outcomes. The concept suggests that "the adequacy of an organism's functioning is dependent upon the degree to which the properties of its environment are in accord with the organism's own characteristics and style of behaving" (Thomas, Chess, & Birch, 1968, p. 137). Educationally applied, goodness-of-fit suggests that school achievement is contingent upon the degree to which properties of the classroom are appropriate relative to student characteristics. If child qualities and behavior are compatible with classroom requirements, harmonious functioning will likely result in satisfactory school performance. On the other hand, if student characteristics are not in accord with first grade requirements and expectations, discordance may lead to inadequate achievement.

Thus, the concept of goodness-of-fit seems particularly relevant when attempting to predict student performance. Typically, kindergarten readiness and screening tests assess student competencies without regard for ecological variations. In trying to predict which kindergarten students will experience difficulty in first grade, system congruence and discordance are never addressed. The assumption seems to be that all first grade classrooms require very similar student attributes. While it may be true that all first grade classes are required to master a very similar curriculum, function in much the same physical environments, and attend school during approximately the same hours, each first grade classroom differs in one critical aspect - its teacher.

The Critical Role of the Teacher

While an ecological orientation assumes all environmental factors have the potential of affecting ecosystem congruence, it is difficult, if not impossible, to deal with all ecological variables. Although a great many environmental factors such as class size (Gump, 1978; Wicker, 1984) and peer relations (Jones & Jones, 1986) clearly influence student achievement, the teacher has frequently been singled out as the most significant and critical variable in any classroom (Borg & Ascione, 1982; Dembo & Gibson, 1985; Emmer, Evertson, & Anderson, 1980; Evertson & Emmer, 1982; Fedoruk & Norman, in press b; Grant & Rothenberg, 1986; Kauffman, Pullen, & Akers, 1986; McDaniel, 1983; Patriarca & Kragt, 1986; Pugach, 1986; Sanford, Emmer, & Clements, 1983). Ozer (1978) suggested that remediation should focus on "changing the perceptions of teachers' own experiences with the child" (p. 32) and Messick (1984) claimed that before children are considered learning disabled, more than one teacher should have been tried. The implication seems to be that teacher perceptions, attitudes, expectancies and practices are critically related to student achievement.

It is the teacher who directs instructional activities, selects materials, interprets curriculum (Gump, 1978), and ultimately evaluates student performance (Jackson, 1968). It is the teacher who provides feedback, encourages and supports, disciplines, reinforces, monitors, corrects and assists. In focusing attention on the teacher, one aspect of the classroom ecosystem is singled out, an aspect thought to be most critical for ecological congruence. As Simpson & Galbo (1986) suggested, "the interaction comprising the student/teacher relationship is the primary instrument for school learning" (p. 37).

It has been suggested that teachers vary widely in terms of their attitudes and beliefs (Brophy & Evertson, 1981; Good et al., 1975; King, 1980; Levine & Wang, 1983; Nash, 1973, 1976). Fedoruk and Norman (in press a) reported that first grade teachers differ markedly from each other in their interpretation, response to, and evaluation of student characteristics. In defining and assessing first grade readiness, however, the possibility that what constitutes readiness for one teacher may not constitute readiness for the next has not been acknowledged (Faust, 1970). Consequently, the prerequisite skills and behaviors necessary for ecological congruence in one classroom may not be identical to those required in another classroom. If ecological congruence is critical to satisfactory student achievement, traditional kindergarten readiness assessment and screening tests have exclusively directed attention at only one aspect of an interactional equation. As Fedoruk (1989) observed;

> ... in attempting to predict the first grade performance of kindergarten students, we examine child characteristics in excruciating detail with total disregard for situational, interactional or ecological variables; in absolute isolation from the contexts or environments in which we expect our predictions to be actualized. (p. 42)

A force in education, perhaps growing in strength, has redirected focus from child characteristics to teacher effectiveness in accounting for student performance (Emmer, Evertson, & Anderson, 1980; Evertson & Emmer, 1982; Gordon, 1974; McDaniel, 1983; Medley, 1977; Sanford, Emmer, & Clements, 1983; Stevens & Driscoll, 1987). In our quest for significant variables that contribute to student success, however, it may prove erroneous to move from a child-deficit model to a teacher-deficit paradigm. Only by examining both student and teacher characteristics, and appreciating their interactive nature, may the essence of learning be apprehended. As Handley (1973) observed;

> A teacher is not a good teacher simply because he has certain characteristics but because of an indefinable something that comes into play when teacher and taught interact. (p. 107)

In the course of educational research, it may now be time to begin to explore, examine, analyze, and explain this "indefinable something." Educational ecologists would suggest this "indefinable something" is teacher-student compatibility which results in ecosystem congruence which in turn translates into satisfying student achievement.

Evaluating Ecological Congruence

Ecology is a relatively recent educational paradigm and consequently "it does not yet have a strong identity as a 'school of thought' and a coded change-technology associated with it" (Rhodes & Paul, 1978, p. 190). As Wicker (1984) suggested, however, it is fortunate that "we don't have to wait for a completely adequate theory to begin to collect information on behavior/environment congruence" (p. 65). In attempting to improve the predictive accuracy of kindergarten screening it is essentially ecosystem congruence which must be examined. That is, to what extent are kindergarten student characteristics appropriate relative to first grade teacher requirements? Does a specific kindergarten student satisfy a specific first grade teacher's behavioral specifications, definition of readiness, cognitive expectations, and personality preferences?

The magnitude of student-teacher interactional variables that impact on ecosystem congruence is very great. As Ambrose (1977) cautioned, the "scope of Ecology is so vast that it might be questioned whether its theories and principles can ever meet the requirement for being called scientific" (p. 5). How, then, can ecology and conventional science be reconciled? How can we begin to quantify ecological phenomena? Because success and failure are related to congruence and discordance, which are interactional consequences, prediction of grade outcome cannot be based on examination of the kindergarten student nor the first grade teacher in isolation. A methodology must be devised by which both pupil attributes and teacher requirements can be evaluated relative to each other. As previously reviewed, traditional readiness and screening tests have focused exclusively on within-student variations. If these within-child characteristics are recognized as only part of what must be known in order to predict teacher-student compatibility, the task becomes one of examining and evaluating a wide range of student attributes and, equally, a variety of teacher values, preferences, biases, and expectancies.

To estimate ecological congruence, for example, it must be known if a first grade teacher requires pupils to have mastered sound-letter correspondence prior to beginning first grade. At what point away from mastery does the teacher form a negative expectancy for student success, believe the student is unteachable, or develop a counterproductive attitude toward the student? Similarly, it must be known if a teacher values student social behaviors more than cognitive strengths. Different teacher values, priorities, and interpretations of first grade student characteristics may affect students differently.

The literature does not readily provide methods of assessing teacher-pupil compatibility in terms of preferred versus actual student characteristics, or teacher and student variables which result in ecological congruence or discordance. Thus, there is no precedent in terms of examining and evaluating the impact of pupil characteristics in relation to teacher preferences, requirements, beliefs, and expectations as they affect ecosystem congruence. Some research does, however, illustrate a number of methods which have been used to evaluate certain ecologically relevant teacher differences.

Teacher Questionnaires

Teacher completed questionnaires have been employed to identify a variety of teacher characteristics, ideals, opinions, and attitudes (Ames, 1983; Brophy & Good, 1974; Chasen, 1975; Good & Dembo, 1973; Mitchell, 1985; Smart et al., 1980). Relative to the purpose of the questionnaire, questions vary considerably but in general teachers are asked to respond to a statement, provide a piece of information, or specify a choice. To illustrate, in examining the influence of teacher attitudes and characteristics on special class placement decisions and on mainstreaming program effectiveness, Smart and her colleagues (1980) developed a questionnaire with items such as "A low-IQ child is less likely to be adequately prepared for life if he or she is placed in a special class, rather than remaining in your class" and "The presence of low-IQ children in your class does not make undue demands on your time" (p. 222). The problem with questionnaires, unfortunately, is that teachers may not always be entirely honest.

Checklists and Rating Scales

Like questionnaires, checklists and rating scales have often been used to identify teacher perceptions and attitudes (Allen & Potkay, 1983; Brophy & Evertson, 1981; Hightower et al., 1986; Keogh et al., 1982; Kornblau, 1982; Mitchell, 1985). A variety of formats exist ranging from simple single word adjectives to Likert scales. Items are not typically standardized or normed as such; rather, a broad range of descriptive or situational possibilities result in an informal evaluation of characteristics and perceptions. The Teachable Pupil Survey (Kornblau, 1982), it may be recalled, was developed to measure teachers' perceptions of attributes which characterize idealized teachable students. On a scale ranging from "not at all" to "almost always", teachers rated students in terms of descriptors such as "curious, inquisitive, questioning", and "enjoys school work". Teacher responses on checklists and rating scales, unfortunately, may not coincide with actual teacher behavioral responses.

Teacher Interviews

Rather than employing a written format as with questionnaires, checklists or rating scales, asking teachers directly is a means of obtaining information about requirements, expectancies, and preferences. Structured interview techniques have been used to assess a number of teacher beliefs, values, requirements, and personality variables (Brophy & Good, 1974; Haller, 1985; Rist, 1975). Since interview questions and responses occur orally, in-depth elaboration and clarification are possible (Hopkins, 1980). Unfortunately, demand characteristics of the interview questions may inadvertently influence teacher responses. The interview generally has at least some structure to its questions and teacher responses are recorded either manually or mechanically (Walker, 1985).

For example, in trying to determine if pupil race affected reading grouping decisions, Haller (1985) asked teachers to construct the reading groups they would recommend to next year's receiving teacher. Respondents were free to create as many groups of whatever size they deemed appropriate. While doing so teachers discussed each child individually, explaining in response to open-ended questions why they chose a particular group for each. Encouraged to speak freely about their pupils, teachers discussed many attributes other than reading ability. "These attributes often seemed to bear little obvious relation to a grouping decision (e.g., family life, classroom behavior, relations with peers, etc.)" (p. 468).

Measures of Student-Teacher Interaction

While evaluation of student-teacher classroom interactions does not directly address teacher variables, certain preferences, attitudes, practices, and biases can be inferred from such measures (Brophy & Good, 1974; Fasano, 1980; Good & Brophy, 1984; King, 1980). If teachers interact positively and frequently with certain types of students while interacting negatively or rarely with other types, the nature of teacher-defined desirable versus less desirable student attributes could be inferred. Methods of coding and categorizing specific interactional exchanges result in an observational session which can be quantified and analyzed. For example, in investigating the relationship between student temperament and first grade teacher-student interactions, Paget, Nagle, & Martin (1984) employed a measure of dyadic interaction. It was found that student temperament characteristics accounted for some of the variance in the number and type of teacher-pupil interactions.

Direct Observation

Observational systems are very similar to measures of student-teacher interaction (Crowl, 1986). Rather than coding and categorizing the type and incidence of student-teacher exchanges, however, observational systems are more generally concerned with everything that occurs in the classroom. Thus, beyond noting specific interactional sequences, the observer takes note of everything in the classroom which may have significance relative to the purpose of observation. Direct observation can be formal with a structure and specific method of coding, or informal where brief notes are made either during or after an observational session (Woods, 1986). Rist (1975), for example, used an informal observational system when exploring the processes whereby expectations and social interactions give rise to the social organization of classrooms. While observing a kindergarten class, he noted that the teacher made a permanent pupil seating arrangement on the eighth day of school. Children were seated around one of three tables with Table 1 being closest to the teacher. Rist observed;

> While none of the children at Table 1 came to class with an odor of urine on them, there were two children at Table 2 and five children at Table 3 who frequently had such an odor. There was not a clear distinction among the children at the various tables as to the degree of "blackness" of their skin, but there were more children at the third table with very dark skin (five in all) than there were at the first table (three). There was also a noticeable distinction among the various groups of children as to the condition of their hair. While the three boys at Table 1 all had short hair cuts and the six girls at the same table all had their hair "processed" and combed, the number of children with either matted or unprocessed hair increased at Table 2 (two boys and three girls) and eight of the children at Table 3 (four boys and four girls). (p. 10)

Measures of teacher-student interaction such as dyadic interaction systems and direct observation have served to increase understanding and appreciation of the complex and reciprocal nature of teacher-student classroom exchanges, and have allowed for speculation regarding the educational consequences of such exchanges. Measures of teacher-student interaction, however, do not permit the prediction of teacher-student congruence or fit. While such techniques provide information regarding the nature and number of classroom exchanges, we cannot be certain of the ecological impact of those interactions. While a teacher may rarely interact with a student, for example, conventional measures of interaction provide no insight into the appropriateness or inappropriateness of a limited number of teacher interactions for any student. It may be a student is independent or temperamentally aloof and frequent teacher interactions, even if positive in nature, may be unwarranted and debilitating.

Measures of teacher-student interaction as well as teacher completed questionnaires, checklists, rating scales, and interview techniques provide information regarding teacher perceptions and classroom dynamics, but as assessment devices they do not allow for ecological interpretation of the relative impact of teacher perceptions and preferences on various student characteristics. That is to say, such approaches do not address the extent to which student variables are compatible or appropriate in relation to teacher biases, expectations, and requirements. If teacher-student congruence or fit is related to student performance, then an assessment technique that allows for the comparison of teacher requirements with actual student characteristics must be employed. Q-methodology may hold some promise as such an ecological evaluative technique. It can be adapted to assess and compare teacher preferences in relation to a large number of student descriptors.

Q-Methodology

In its simplest form, q-methodology uses a rank ordering of statements or descriptors (Hopkins, 1980). In using the q-technique, some 60 to 100 descriptive statements, growing out of some kind of implicit or explicit theory, are generated (Kerlinger, 1973; Remmers, 1963). Having written each statement on a card, the experimenter has individual subjects rank each descriptor along some continuum such as 1) strongly agree, 2) agree, 3) strongly disagree. Forced distributions may or may not be included. That is, the number of cards permitted in each pile may be specified in order to approximate a normal distribution. After statements are ranked, a correlation technique compares rankings among different individuals or rankings at different times.

Stephenson (1953), the originator of q-methodology, envisioned the technique as highly versatile, and Kerlinger (1973) claimed that "Q can be used to open up new areas, to test preliminary theories, to explore heuristic hunches" (p. 597). Like all research methods, q-sorting has been subject to criticism. Concerns regarding sample size and statistical limitations are not without grounds. A q-sort procedure, however, seems particularly appropriate for evaluating teacher-student compatibility or congruence. Such a procedure allows for comparisons between individuals in terms of large numbers of descriptors. As well, q-sorts are comparatively quick, economic, and portable. Although some modification may be necessary, q-methodology seems amenable to the empirical investigation of evaluating ecological congruence and discordance.

Statement of the Problem

Traditional kindergarten screening techniques and devices have reported significant correlations with subsequent measures of first grade student achievement. However, none have been able to predict student performance with an overwhelming degree of accuracy. Screening kindergarten students in order to predict first grade learning problems and school failure has at best reported hit rates of approximately 75%. Thus, some 25 out of 100 pupils are inaccurately predicted in terms of actual first grade performance. Such gross errors of over and underidentification are difficult to justify on either humanitarian or economic grounds.

Part of the reason traditional kindergarten screening has been characterized by predictive inaccuracies may be the conceptual inadequacy of a child-deficit model upon which such practices have exclusively been based (Fedoruk, 1989; Fedoruk & Norman, in press a). An alternate conceptualization, the ecological model, may be more educationally appropriate. From an ecological perspective, school failures are not merely the consequence of child deficiencies but rather the result of discrepancies between child characteristics and environmental requirements. Thus, in identifying first grade failure presymptomatically, prediction should be concerned with evaluating the extent to which child characteristics are in accord with teacher requirements, preferences, demands, and expectations.

This study attempted to improve the accuracy with which first grade student achievement from a kindergarten population can be predicted. Based on ecological assumptions regarding the nature and causes of learning problems and school failure, the study lacked precedent, particularly with regard to the ecological assessment of teacher-pupil congruence/discordance. Bearing in mind that the study was highly exploratory and that it represented an initial attempt to practically apply a radical orientation to educational phenomena, it appeared that four distinct steps or stages in data gathering were required prior to analyses of ecological fit between teachers and students.

First, an appropriate q-sort procedure for evaluating both teacher and student characteristics was developed. Second, a sample of at-risk kindergarten students was identified and profiled in terms of a comprehensive list of conventional as well as unconventional educational risk factors. Third, the first grade teachers who received these at-risk kindergarten students was profiled in terms of their reaction to and interpretation of the educational impact of these same risk factors. Finally, when the at-risk sample of students had completed first grade, measures of their achievement were obtained. When all this data was in place, a means was devised to compare pupil profiles with corresponding first grade teacher profiles in order to assess and characterize the extent of ecological congruence. Once an appropriate metric of ecological congruence was developed and applied, it was compared to end of first grade student achievement. This comparison, student-teacher congruence with end of first grade student achievement, formed the basis of an ecological strategy for the prediction of early school failure and success.

CHAPTER III

DEVELOPING THE Q-SORT PROCEDURE: STEP 1

Before attempting to evaluate the congruence between kindergarten pupil profiles and receiving first grade teacher profiles, some initial development and refinement of q-sort procedures and materials appeared necessary. The suitability of q-sort to ecological purposes required examination. Also, that all critical student variables were included in the sorting cards needed confirmation. As well, q-sort reliability needed to be established. If q-sort procedures did not yield reliable data, final results and analyses may be difficult to interpret.

Step 1: Methods and Procedures

Subjects

One male and 20 female first grade teachers ranging in age from 29 to 50 years (mean age 39.0) were randomly selected from six elementary schools in a Canadian city. All six schools housed kindergarten to grade six students. Schools were in four different areas of the city and included lower middle-class to upper middle-class students. The teachers ranged in total years of teaching experience from 6 to 27 (mean 15.8) and in terms of first grade teaching experience from .5 to 19 years (mean 7.2). In general the teachers taught in conventional first grade arrangements with approximately 25 pupils per teacher and one teacher per classroom. Typically some option (i.e., library, music) was taught by an alternate teacher. The sample included, however, one case of team teaching in a grade 1-2 context and one case in which two teachers divided the curriculum for one class of first grade students.

Student Descriptors

Eighty-six descriptive characteristics were generated from the previously reviewed research literature (Appendix A). Descriptors were chosen on the basis of an implied or established, direct or indirect, relationship to first grade student achievement. After reviewing the literature, student attributes frequently associated with first grade students' success and failure were compiled. These included linguistic, perceptual, motoric, behavioral, and academic readiness characteristics and were obtained from the checklists, rating scales, readiness assessment devices, standardized kindergarten and first grade tests, and early identification research reviewed in the previous chapter. In an attempt to broaden conceptual focus, unconventional student characteristics that have also been implicated in first grade student performance, descriptors concerned with student ethnicity, socioeconomic status, familial structure and interactions, gender, personality, age, and physical appearance were also included. Since lists or sources of these sorts of student attributes were not readily available, descriptors were in some cases creatively generated and in other cases generated from research literature outlined in the previous chapter.

Data Collection

Each student descriptor was typed on a 10 cm by 5 cm white card. The cards were shuffled and presented to each teacher as a deck. Nine yellow cards (6 cm by 14 cm) were laid out in front of each teacher on a table. At the bottom of each yellow card, from the card on the far left of the teacher to the card on the far right, one of the following rankings was typed: absolutely contributes to student success; strongly contributes to student success; moderately contributes to student success; mildly contributes to student success; mildly contributes to student failure; moderately contributes to student failure; strongly contributes to student failure; absolutely contributes to student failure. On the bottom of the ninth yellow card the word "irrelevant" was typed. This ranking was placed slightly above the other yellow cards suggesting it was an option and not necessarily a neutral position between "mildly contributes to student success" and "mildly contributes to student failure".

Having presented the deck of 86 descriptor cards to each teacher, the examiner explained, "On each card is a word or phrase that describes a certain aspect of a student early in first grade. For you as a grade one teacher, based on your interpretation of curriculum, your management of classroom proceedings, your experience, and your evaluation of students, place each card where you feel it best belongs. Does it absolutely contribute to student failure? (Point to the yellow card on the table which contains that ranking.) Does it mildly contribute to student success? (Point to the yellow card on the table which contains that ranking.) Or is it, in your opinion, irrelevant in terms of student success or failure in your classroom? (Point to yellow ranking card with 'irrelevant' typed on it.)" Teachers were free to ask questions and clarify instructions; some asked many questions and sought elaboration of most student descriptors; others asked few or no questions. The time necessary to complete sorting of student descriptor cards ranged from 12 to 37 minutes (mean 24). Eighteen of the 21 teachers elected to go over and check their rankings of student descriptor cards.

The sorting procedure was completed in every case within the school, either during a free period, at noon, or after school. Every teacher made at least a few verbal comments while sorting the descriptors; some gave elaborate verbal justification for ranking cards as they did. Immediately following the procedure, the examiner made notes regarding this "thinking aloud". These notes contributed primarily to analyses of procedure and descriptor validity.

After each teacher had completed the ranking procedure, the examiner queried the completeness of the student descriptors. "Can you think of any student characteristics that in any way, directly or indirectly, in the long or short-term, affect first grade student achievement or functioning which were not included in these descriptor cards?" No teacher was able to add to the list of 86 descriptors. A few teachers mentioned descriptors, but these characteristics were, in every case, already contained in the descriptor cards.

On the reverse of each descriptor card a number from 1 to 86 was written. A record keeping form was developed to record background teacher variables, note teacher comments and relevant information, and record ranking of student descriptors (Appendix B). Each of the nine rankings was given one column on the record form. Teacher rankings of all 86 student descriptors were recorded simply by copying the number on the reverse of each card in the appropriate column on the record form. All 21 teachers, including the five teachers who repeated the sorting in order to check reliability, completed the procedure during January and February of 1988.

Validity

Because student descriptors were generated from the research literature and from sources which addressed validity, it was assumed that they accurately reflected student characteristics related to academic achievement. In analyzing teacher verbalizations during the sorting procedure, however, it seemed that some descriptors were ambiguous and subject to personal interpretation. For example, the student descriptor "Parents are currently undergoing marriage counselling" was in some cases interpreted as contributing to student failure and in other cases interpreted as contributing to student success. The rationalizations behind these rankings were related to subjective interpretations of the descriptor. Some teachers focused on the implication that familial harmony was lacking; others focused on the implication that the family was trying to work through its difficulties. Qualitative analyses of these sorts of teacher verbalizations suggested that some refinement of student descriptors was necessary.

Reliability

The consistency of teachers' ranking of student descriptors over time was addressed. Four to six weeks after initial sorting of student descriptors, five teachers repeated the procedure. Test-retest consistency of rankings ranged from 98.8% to 81.4% (mean 91.8%) allowing for one position movements on the nine-point continuum. It was reasoned that allowing for one position movements (i.e., from "absolutely contributes to student failure" to "strongly contributes to student failure"), the procedure was sufficiently reliable to permit data interpretation and analyses.

Step 1: Presentation and Discussion of Outcome Data

For each of the 86 student descriptors frequencies were tabulated. In general, teachers ranked descriptors very differently. There were no descriptors which all 21 teachers ranked the same and few descriptors which had only two or three different rankings. The most typical distribution of rankings ranged from "irrelevant" to "absolutely contributes to student success" or "absolutely contributes to student failure". There were only occasional examples of a descriptor contributing to both success and failure. "Irrelevant" was a popular ranking. For 62 of the 86 student descriptors, at least one teacher ranked the descriptor as irrelevant.

For purposes of discussion Table 1 presents a sample of descriptor frequency data. (Refer to Appendix C for remaining descriptor frequencies.) As can be seen, there was more agreement among teachers for some descriptors than for others. For example, 20/21 teachers ranked "Has a negative attitude toward self" as strongly or absolutely contributing to failure. All teachers ranked "Has a positive attitude toward school and learning" as absolutely to moderately contributing to student success. For a few descriptors, the majority of teachers responded identically. For example, 81% of the teachers ranked "Names basic colors" as mildly contributing to student success. For some descriptors, the majority of teachers ranked a descriptor within one position. For example, 90% of the teachers ranked "Copies shapes incorrectly" as mildly or moderately contributing to failure.

Means and standard deviations for rankings of student descriptors are presented in Table 2. While mean rankings do not address the central concern of teacher variability, they do provide a measure of general trend of teacher rankings for each student descriptor. For example, the descriptor "Very clean and well dressed" had a mean ranking

Table 1

Sample of Step 1 Frequency of Teacher Rankings of Descriptors

Descriptor	Ranking*	Frequency	Percentage
Has a negative attitude toward self	7	1	4.8
	8	8	38.1
	9	12	57.1
Has a positive attitude toward school and learning	1	14	66.7
	2	4	19.0
	3	3	14.3
Names basic colors	2	2	9.5
	3	1	4.8
	4	17	81.0
	5	1	4.8
Copies shapes incorrectly	6	12	57.1
	7	7	33.3
	8	1	4.8
	9	1	4.8
Does not know any alphabet sounds	5	1	4.8
	6	2	9.5
	7	11	52.4
	8	6	28.6
	9	1	4.8
Does not enjoy books	6	2	9.5
	7	5	23.8
	8	9	42.9
	9	5	23.8
Cannot hold pencil properly	4	1	4.8
	5	3	14.3
	6	10	47.6
	7	3	14.4
	8	3	14.3
		1	4.8

* 1 = absolutely contributes to student success
2 = strongly contributes to student success
3 = moderately contributes to student success
4 = mildly contributes to student success
5 = irrelevant
6 = mildly contributes to student failure
7 = moderately contributes to student failure
8 = strongly contributes to student failure
9 = absolutely contributes to student failure

Table 2

Step 1 Means and Standard Deviations of Teacher Rankings

Descriptor[a]	Mean[b] Rank	Std. Dev.
Poor clothing	4.19	1.33
Clean	4.00	.84
Dirty hair	5.76	.94
No supplies	6.00	.78
Poor lunches	7.24	1.14
Father doctor	3.71	1.19
Poor hygiene	5.86	1.20
Mother teacher	3.43	1.12
On social assistance	5.86	1.06
Female	4.52	.75
Male	5.10	.77
Physically small	5.33	.48
Physically large	4.91	.63
Never has colds	4.00	.84
Often has colds	6.29	1.15
Very strong	2.76	1.04
Unattractive	5.38	.67
Attractive	4.67	.66
Thin and pale	6.33	1.16
5 1/2 years old	6.62	1.43
6.0 years old	3.04	1.36
6 1/2 years old	2.76	1.18
Eskimo	5.14	.36
Native Indian	5.81	.93
Anglo-Saxon	4.52	.87
Caucasian	4.67	.66
Chinese parents	4.33	1.24
Parents interested	1.81	.68
Father supports	4.24	.99
Only child	4.48	1.08
Siblings	4.52	1.20
Attend interviews	2.71	1.23
Marriage counselling	6.19	1.69
Parents divorced	7.48	1.08
Father out-of-town	5.71	.72
Single parent	6.00	.89
Child overreacts	7.00	1.00
Negative attitude	8.52	.60
Positive attitude	1.48	.75
Extroverted	3.33	.97
Calm	3.43	.98
Confident	2.00	.78
Emotionally stable	1.95	.92
ESL	6.91	1.18

Table 2 (Continued)

Step 1 Means and Standard Deviations of Teacher Rankings

Descriptor[a]	Mean[b] Rank	Std. Dev.	Descriptor[a]	Mean[b] Rank	Std. Dev.
Indian reserve	5.43	1.08	Disturbs others	7.19	.81
Canadian	4.52	.81	Cooperative	2.33	.86
Immigrant	6.23	1.33	Uncomfortable	6.42	.81
Articulate	2.52	1.47	Shy	5.71	.85
Inarticulate	6.86	1.11	Out of seat	6.90	1.22
Diff. remembering	7.67	.86	Disruptive	6.96	1.28
Diff. understanding	7.67	.80	Good work habits	1.86	.91
Not conversive	6.38	.97	Disorganized	7.10	.83
Repeats sentence	3.00	1.00	Incomplete work	7.10	.55
Follows directions	2.67	1.11	Works unsupervised	1.76	.77
Recalls details	2.24	.63	Inattentive	8.29	.56
Communicates well	1.91	.54	Begins tasks	1.71	.56
Jumps-skips	3.86	.57	Names colors	3.81	.68
Clumsy	5.91	.77	Letters-sounds	2.48	.87
Neat printing	3.62	.87	Words-objects	2.14	1.01
Reverses words	5.95	.97	Prints first name	3.62	.67
Copies incorrectly	6.57	.81	Counts	3.43	.93
Letters reversed	5.86	.96	Confuses colors	6.81	.81
Prints off line	5.52	.51	No alphabet	7.19	.87
Recog. spoken diff.	2.90	1.33	Doesn't enjoy books	7.81	.93
Recog. written diff.	2.38	1.16	Can't hold pencil	6.29	1.10

[a] Refer to Appendix D for unabbreviated descriptors.

[b] Refer to Table 1 for description of ranking continuum.

of 4.0 which indicated overall teachers ranked that student characteristic as mildly contributing to school success. Standard deviations, on the other hand, do provide measures of variability around the mean. The extent to which teacher rankings of student descriptors varied around the mean showed considerable variability. The student descriptor "Eskimo", for example, had a standard deviation of only .36 which suggested that in general teacher rankings of that pupil characteristic did not evidence much variability. The student descriptor "Parents are currently undergoing marriage counselling", conversely, had a standard deviation of 1.69 which suggested that teachers varied considerable in their ranking of this attribute.

Step 1: Summary and Perspective

The purpose of Step 1 was to develop and refine a q-sort procedure which could reliably be used to profile kindergarten pupils as well as their receiving first grade teachers. Step 1 outcome data suggested that the procedure developed was sufficiently reliable to yield interpretable results. It also established considerable teacher variability; a point consistent with ecological hypotheses. One would anticipate that teacher variations in rankings are related to, or impact upon, teacher-student congruence and discordance.

While Step 1 did confirm the appropriateness of a q-sort procedure for profiling teachers' interpretations of the educational impact of student descriptors, and did establish the completeness of student attributes included, some clarification and elimination of certain descriptors appeared necessary. Descriptors which were viewed by teachers as redundant, vague, and ambiguous, consequently, were amended for subsequent profiling of students and teachers. Having refined the list of student descriptors, the task now became one of identifying and profiling a group of at-risk kindergarten students.

CHAPTER IV

KINDERGARTEN PUPIL PROFILES: STEP 2

The first objective of Step 2 was to identify a group of students who were just completing kindergarten, who would be in a regular grade one context the following September, but whose performance or achievement in first grade was questionable or uncertain. Having identified such a group of kindergarten students, the second objective of Step 2 was to profile each of these pupils in terms of the descriptive characteristics refined in Step 1. Such a description of each of these at-risk students would eventually contribute toward evaluating the congruence or fit of at-risk students with their receiving first grade teachers.

Step 2: Methods and Procedures

Refining Student Descriptors

Based on both qualitative and quantitative results from Step 1, the initial list of student descriptors (Appendix A) required semantic and content modification. In an attempt to reduce the number of student descriptors to a manageable figure as well as increase item clarity, several changes to the initial list occurred. First, descriptors that did not appear to discriminate between teachers (e.g., "Eskimo", "Caucasian") were omitted. Second, some descriptors were subsumed under new more general attributes. For example, "Father is a medical doctor" and "Mother is a teacher" became "Parent/s are professionals". Third, when more than one item appeared to assess a very similar student characteristic, only the descriptor that generated the least confusion among Step 1 teachers was retained. For example, many of the descriptors concerned with familial harmony were reduced to the student descriptor "From a single parent family". Qualitative analysis of Step 1 teachers' comments suggested that often teachers are unaware of certain familial dynamics such as "Parents are currently undergoing marriage counselling". Fourth, except for purposes of evaluating inter-item reliability, most polar items (i.e., "Frequently has colds", "Never has colds",) were collapsed (i.e., "Has colds"). Finally, vague multifaceted descriptors were omitted, simplified, or subsumed under other items. The result was an abbreviated, delineated, and clarified list of student descriptors (Appendix D).

Selection of Schools and Kindergarten Classes

Ideally, four or five very large elementary schools with multiple kindergarten and first grade classes would have provided the best possible pool of kindergarten students for this study. If such a sample of schools could have been obtained, several kindergarten classes would stream into several first grade classes. That is to say, several kindergarten teachers would prepare a large number of students for several first grade teachers. Consequently, the kindergarten teachers would not likely be aware of potential first grade teacher-student interactive variables that might affect student performance and that, thus, might influence a kindergarten teacher's conceptualization of students at-risk for first grade learning and school problems. Kindergarten retention and promotion decisions, as well as identification of kindergarten students at-risk, may be affected by characteristics of the first grade teacher. Ideally, for purposes of this study, kindergarten teachers should not be aware of the preferences, biases, tolerances, and expectancies of the first grade teachers to which their kindergarten students would be assigned.

Unfortunately, due to a variety of circumstances, such an ideal sample of schools was not obtained. Some schools with large kindergarten classes (> 100 students) had inadvertently been used in Step 1, thereby negating their use in Steps 2 to 4. Others had recently been or were currently involved in kindergarten and first grade longitudinal studies and were therefore reluctant to make a further commitment. Still others were not receptive due to characteristics of the research design (i.e., use of standardized tests in first grade), or to characteristics of the school (i.e., over-crowding).

In the end, six schools with large kindergarten-first grade populations agreed to participate in the study. Unfortunately, once data collection began it was discovered that they too were somewhat less than ideal. In one school the entire kindergarten population was deemed inappropriate due to program innovations (4 year primary school programs). Of the remaining five schools, four had French and/or Ukrainian immersion kindergarten and first grade classes. Attempting to minimize confounding variables, only students in regular English kindergarten programs were included in the study. Because of this, some English kindergarten teachers may have been aware of certain English first grade teachers' attitudes, biases and so on. This may have influenced some placement decisions regarding students.

Ultimately, 218 kindergarten students from 10 classes in five different schools in four different areas of the city served as the pool from which the sample was drawn. In general, these areas were lower-middle class to upper-middle class. Since two kindergarten teachers taught two classes of regular English kindergarten students, eight kindergarten teachers identified and profiled the final sample of students.

Selection of At-Risk Subjects

In May of 1988 each of the eight kindergarten teachers were met individually. Following initial introductions, expressions of gratitude for participation, and a very brief outline/explanation of the study, each teacher was asked to identify by name any and all students who would be in a regular English first grade program in that school the following September, but whose academic/behavioral success was questionable. That is to say, if next year those pupils experienced some difficulty in first grade, the kindergarten teacher would not be surprised. Students retained in kindergarten, recommended for special needs placement, or changing schools were not included in the sample.

All eight kindergarten teachers required at least a little elaboration and discussion regarding the meaning of first grade success and failure. Consistent with the three facets of performance used as criterion or outcome variables in Step 4, in as involved and detailed a dialogue as the teachers pursued, success was outlined in terms of first grade teacher evaluations, standardized achievement test results, and parental impressions/evaluations of student performance.

With varying degrees of certainty and for a wide variety of reasons, kindergarten teachers identified pupils whom they believed might not perform adequately in first grade. In several cases kindergarten teachers expressed a great deal of certainty that particular students were not cognitively, behaviorally, and/or emotionally ready for first grade. Consistently, these students had already spent two years in kindergarten and thus were being promoted to first grade, or were being promoted to first grade at parental insistence in defiance of kindergarten teacher recommendations. Such students were included in the sample. For some kindergarten students, English was a second language (ESL). Since these students did not satisfy ESL class placement criteria and since their first grade performance was uncertain, they were also included in the sample.

From the original pool of 218 kindergarten students, 53 satisfied inclusion criteria. That is to say, 53/218 kindergarten pupils would be in a conventional English first grade program in the same school the following September, and also were identified by their kindergarten teachers as possible first grade learning and/or behavior problems. While 25% may seem a rather exaggerated proportion of kindergarten students identified as at-risk, an explanation emerged from conversation with kindergarten teachers.

It seems that in schools that offer language immersion kindergarten and first grade programs, the corresponding English programs receive a disproportionate number of "problem" or "special" students. For example, most ESL students and students of immigrant parents, attempting to improve English language proficiency, attend English kindergarten programs. In the same sense, children who have any of a number of cognitive, behavioral, linguistic, medical, or readiness deficits, generally are placed in English programs. The rationale appears to be that introducing a second language might intensify or even aggravate these sorts of problems. Also, it seems that a disproportionate number of students from low socioeconomic backgrounds and from single parent families, were contained in English kindergarten classes. This seemed logical. Parents raising a bilingual child tend to be upwardly mobile and, conversely, bilingualism tends not be a priority for families struggling to satisfy basic needs.

Data Collection: Kindergarten Pupil Profiles

In order to evaluate the congruence or discordance between pupils and teachers, the second objective of Step 2 was to develop a profile for each kindergarten student identified. Thus, after each kindergarten teacher had identified by name all students who would be in a regular English first grade program in the same school the following September but whose academic/behavioral success was uncertain, she completed a brief profiling procedure for each such pupil. Taking between five and ten minutes, the procedure had three sections or aspects. First, background variables such as birthdate, gender, school, and so on were discussed and noted by the researcher. To help the kindergarten teacher focus on the child being profiled as well as contributing to qualitative analyses, a brief discussion of the child's basic problems as perceived by the kindergarten teacher followed, on which a few notes were taken. Second, six questions that required simple yes/no responses were asked. This was necessary because several of the student descriptors validated in Step 1 did not apply to pupils as a matter of degree. For example, "From a single parent family" and "On social assistance" either applied or did not apply to a specific student. Third and finally, 52 student descriptors were sorted according to the degree to which the student demonstrated these characteristics and behaviors.

Each of the 52 student descriptors was typed on a 10 cm by 5 cm white card. The cards were shuffled prior to each sorting and presented to each kindergarten teacher as a deck. Five other white cards (6 cm by 14 cm) were laid out in front of the teacher on a table. At the bottom of each of these cards, from the card on the far left of the teacher to the card on the far right, the numbers 1 to 5 were typed. Above the number "1" was the word "NEVER" and above the number "5" was the word "ALWAYS". Teachers sorted descriptor cards by placing them on appropriate continuum positions.

Each of the student descriptor cards to be ranked in Step 2 was assigned a number from 1 to 52. After the sorting procedure was completed, the researcher recorded the ranking of 1 to 5 simply by placing the appropriate number next to the descriptor number contained on the Student Profile Data form. Appendix E was used to profile each of the at-risk kindergarten students. It summarizes and illustrates each of the three sections or aspects of the profiling procedure.

Validity of Student Identification and Profiles

An important Step 2 issue is the validity of at-risk student identification and profiling procedures. Having specific kindergarten teachers identify and profile at-risk students may appear inconsistent with ecological conceptualizations of failure as the consequence of child-environment interactions. However, since it was necessary to select a sample, some means of identification must be employed, and since student profiles were required, some method of obtaining such data must likewise be employed.

Increasingly, recent research appears to demonstrate that teachers' judgements, predictions, and evaluations of pupils' elementary school performance are as accurate as the best standardized indices (Cooksey, Freebody, & Davidson, 1986; Shinn, Tindal, & Spira, 1987; Simner, 1986; Williams & Iverson, 1985). Also, because relatively general non-specific evaluations were required (i.e., less than adequate first grade performance), and because final analyses (Chapter VII) would not be jeopardized by minor profiling inaccuracies (i.e., slight movements on the ranking continuum), it was reasoned that Step 2 identification and profiling procedures resulted in a sample of students who were appropriate for the study, and student profiles which were sufficiently valid for study purposes.

Reliability of Student Profiles

Since dominant characteristics rather than fluctuating daily behaviors were of primary concern, reliability in terms of actual child changes was not a critical issue. Rather, reliability of Step 2 student profiling seemed most acutely concerned with the consistency with which kindergarten teachers profile the same student over time. Given the time frame of the design, conventional test-retest reliability evaluation was not feasible. Therefore, inter-item reliability was evaluated.

Built into the list of student descriptors were three instances of opposite or polar items and one instance of synonymous or equivalent items. For example, "Confuses basic colors" and "Knows colors" are polarized items. Consequently, for each individual student profile, the ranking given one such descriptor should correspond with the ranking given the other. That is to say, if a student "always" confuses basic colors, he/she should "never" know colors. Inter-item reliability of student profiles is summarized in Table 3.

Table 3

Step 2 Inter-Item Reliability of Pupil Profiles

Items	Correspondence With One Continuum Position
Confuses basic colors Knows colors	81.25%
Good personal hygiene Dirty and unkempt	100%
Verbally articulate Inarticulate speech	87.5%
Associates letters with their most frequent sounds Knows alphabet sounds	87.5%
Mean reliability	89.06%

As can be seen from Table 3, inter-item reliability allowing for one ranking position movements was quite high. However, it should be noted that several instances of inconsistent teacher ranking of student descriptors were apparent. This may or may not have been the consequence of differential literal teacher interpretations as opposed to differential actual teacher interpretations. For example, in one profile, a student was characterized as "never" knowing alphabet sounds and "often" associating letters with their most frequent sounds. Whether this contradiction in teacher rankings of student attributes was the result of ambiguous descriptors, teacher carelessness, or response recording error was not the main concern. Rather, it appeared that in at least a few cases aspects of student profiles were inaccurate and contradictory. Checking student profile reliability in this way, however, did not provide an index of individual teacher descriptor ranking consistency, but rather, only provided a guage of overall teacher reliability. While an item by item estimate of rating consistency could have been employed, it was reasoned that because overall teacher reliability was high, such a method may not have been an appropriate method of differentiating teachers in terms of reliability scores.

Step 2: Presentation and Discussion of Outcome Data

A sample of 53 at-risk kindergarten students who would be in first grade the following September had been obtained. While there was evidence of considerable variability within and between students, the group itself demonstrated some interesting characteristics. As examination of Table 4 reveals, 60% of the sample were male, while 40% were female. Given previously reviewed research that suggested boys more frequently experience school problems than girls, this

Table 4

Step 2 Frequency of Age, Gender, and YES-NO Response Rankings of Student Descriptors

Student Descriptor	Number of Students (/53)	Percentage of Sample
Male	32	60.4%
Female	21	39.6%
5-1/2 years old when beginning first grade	16	30.2%
6.0 years old when beginning first grade	21	39.6%
6-1/2 years old when beginning first grade	16	30.2%
Parent/s are professionals	3	5.7%
English is a second language	16	30.2%
From a single parent family	16	30.2%
On social assistance	7	13.2%
Younger siblings	21	39.6%
Only child	7	13.2%

disproportionate distribution was anticipated. Some sorting of students on the basis of gender, however, may have occurred during previous student identification.

Table 4 also summarizes the distribution of at-risk pupils in terms of age. There were as many old children (6 1/2 years) as young children (5 1/2 years); children of average age (6.0 years) represented a slight majority. If age is a factor related to risk status as some previously reviewed research suggested, it does not appear to act in isolation from other factors. Also, 30% of the sample was ESL, and 30% came from single parent families. While this was consistent with qualitative teacher input as well as with certain previously reviewed research, such data are difficult to interpret without an appreciation of the relative number of these sorts of students in a normal non-risk population. Particularly, sorting of students on the basis of these sorts of characteristics may have occurred during the original student identification procedures.

Frequencies of teacher rankings of the 52 student descriptors that characterized pupils as a matter of degree were calculated. On 45 of the 52 descriptors, rankings ranged from "1" (never) to "5" (always). For example, of the 53 children in the sample on the student descriptor "Has difficulty sitting still, may wriggle a lot or get out of seat", 6 were never that way, 14 were seldom that way, 11 were sometimes that way, 12 were often that way, and 10 were always that way. In terms of virtually every student descriptor, this sort of variability was more the rule than the exception.

However, a few descriptors for which most students were similarly ranked were apparent. For the student descriptor "Dirty and unkempt", to illustrate, 40/53 students were rated by their kindergarten teachers as "1", never demonstrating that characteristic. By far the most common distribution of student rankings, however, appeared to be where most students were spread over three ratings, and the remaining students distributed over the remaining two (often extreme) rankings. The student descriptor "Good work habits", for example, adhered to such a distribution; two students never demonstrated good work habits; 13 students rarely, 15 students sometimes, 20 students often, and 3 students always showed good work habits. Table 5 presents frequencies for selected student descriptors. (Refer to Appendix F for complete Step 2 descriptor frequency data.) As can be seen, the 53 at-risk students appeared to be rated very differently from one another on the descriptors sorted by their kindergarten teachers.

An identical conclusion is likely to follow examination of Table 6 which presents item means and standard deviations. Student descriptor ranking means, interestingly, are very similar to each other. When rankings were averaged, student variability became camouflaged. Item means, however, do outline certain critical features of the sample. The group of 53 children, for example, almost always (mean ranking of 4.47) had "appropriate clothing". Generally (mean ranking of 3.83) parents of children in the sample were "interested, supportive and concerned".

More critical to ecological conceptualizations, Table 6 also presents standard deviations for each of the 52 items teachers rated as characteristic to uncharacteristic of the sample of at-risk children. As can be seen, most item rankings varied more than one continuum position around the mean. The smallest standard deviations were just under one continuum position (i.e., .81), while the largest standard deviations were generally about one and one-third continuum positions

Table 5

Sample of Step 2 Frequency of Teacher Rankings of Student Descriptors

Descriptor	Ranking[a]	Frequency	Percentage
Has difficulty sitting still, may wriggle a lot or get out of seat	1	6	11.3
	2	14	26.4
	3	11	20.8
	4	12	22.6
	5	10	18.9
Good workhabits	1	2	3.8
	2	13	24.5
	3	15	28.3
	4	20	37.7
	5	3	5.7
Works well without adult supervision	1	3	5.7
	2	14	26.4
	3	13	24.5
	4	19	35.8
	5	4	7.5
Completes assignments on time	1	6	11.3
	2	10	18.9
	3	10	18.9
	4	20	37.7
	5	7	13.2
Able to begin and complete classroom tasks	1	1	1.9
	2	9	17.0
	3	13	24.5
	4	14	26.4
	5	16	30.2

[a] 1 = never; 5 = always

Table 6

Step 2 Means and Standard Deviations of Teacher Rankings of Student Descriptors

Descriptor[a]	Mean[b] Rank	Std. Dev.	Descriptor[a]	Mean[b] Rank	Std. Dev.
Out of seat	3.11	1.31	Holds pencil	4.15	1.15
Healthy	4.11	.95	Completes assign.	3.23	1.23
Recalls details	3.41	1.17	Inattentive	3.02	1.17
Bashful	2.79	1.30	Enjoys books	3.94	.84
Good hygiene	4.48	.85	Approp. clothing	4.47	.93
Negative attitude	2.26	1.13	Prints first name	4.30	1.07
Parents interested	3.83	1.33	Word - picture	2.70	1.23
Positive attitude	3.77	1.07	Prints on line	2.81	.92
Has colds	2.72	1.03	Articulate	3.47	1.32
Calm	3.19	1.16	Inarticulate	2.13	1.19
Confident	3.30	1.12	Reverses letters	2.71	.89
Emotionally stable	3.36	1.08	Recog. spoken diff.	3.17	1.05
Overreacts	2.68	1.30	Recog. written diff.	3.09	.81
Extroverted	3.45	1.35	Copies correctly	3.75	.87
Communicates well	3.34	1.25	Neat printing	3.15	1.21
Letters-sounds	2.62	1.13	Completes tasks	3.66	1.14
Disorganized	2.59	.97	Clumsy	2.09	1.11
Confuses colors	1.57	1.03	Jump - skip	3.79	1.23
Good workhabits	3.17	.99	Diff. remembering	2.81	1.06
Counts correctly	4.06	1.20	Diff. understanding	2.74	1.16
Knows colors	4.63	.84	Repeats	3.68	1.14
Disturbs others	2.76	1.22	Initiates conver.	3.64	1.23
Cooperative	3.62	1.06	Follows directions	3.57	1.03
Disruptive	2.80	1.33	Dirty	1.47	.95
Works unsupervised	3.13	1.07	Clean	4.53	.82
Uncomfort. new sit.	2.87	1.29	Knows alphabet	2.57	1.23

[a] Refer to Appendix D for unabbreviated descriptors.

[b] 1 = Never; 5 = Always.

(i.e., 1.33). It seemed, again, there was considerable variability in terms of the characteristics and attributes of at-risk students profiled in Step 2.

Step 2: Summary and Perspective

Step 2 utilized a refined list of student descriptors that was also employed later in Step 3 to profile attitudes of receiving first grade teachers. While the schools and kindergarten classes that participated in the study were not conceptually ideal, an acceptable at-risk population of 53 students was identified by eight kindergarten teachers in five different schools. Although some slight problems with reliability were noted, student profiles appeared adequate for final ecological analyses and interpretations.

Examination of Step 2 outcome data, ranking frequencies, means, and standard deviations, appeared to demonstrate considerable variability among students in the at-risk sample. That is to say, each of the at-risk students were characterized to varying degrees by varying relative strengths and weakness, by different assets and deficits. It seemed kindergarten students at-risk of first grade learning and school problems were individually unique as well as heterogenious as a group.

Having identified an adequate sample of at-risk children, having profiled these children in terms of a number of predetermined characteristics (Step 1), and having found considerable variability, the next task concerned establishing elements in the idiosyncratic nature of the attitudes of receiving first grade teachers. That is, the first grade teachers who received these at-risk kindergarten students must now be identified, and their perceptions and interpretations of the educational impact of the characteristics associated with the student profiles must be evaluated.

CHAPTER V

FIRST GRADE TEACHER PROFILES: STEP 3

By the end of May, 1988, all kindergarten student profiles were completed. It was necessary to wait until September, 1988, to identify and profile the first grade teachers to which these children had been assigned (Step 3). When these students had completed first grade their achievement could be evaluated (Step 4). Ultimate analyses would involve establishing if teacher-pupil profile compatibility was related to end of first grade achievement, and consequently, a factor with predictive utility.

Step 3: Methods and Procedures

On September 13th, 1988, each school involved in Step 2 was contacted. From the schools' secretaries, it was learned that eight of the 53 kindergarten pupils previously profiled had moved, all to schools outside the boundaries of this study. The remaining 45 pupils were distributed among 12 first grade teachers. The name of the first grade teacher of each of the profiled kindergarten students was obtained from school secretaries, so as to minimize teacher attention to target pupils.

Subjects: Receiving First Grade Teachers

All 12 first grade teachers were female, ranging in age from 29 to 50 years (mean 38.6 years). They ranged in terms of teacher training from 3 to 5 years (mean 4.08 years), in total years of teaching experience from 5 to 26 (mean 13.5 years), and in years of experience teaching first grade from 0 to 23 (mean 9 years). Two teachers team taught. Two other teachers shared the curriculum; one teaching from Monday to Thursday, the other teaching only on Fridays. As previously mentioned, several of the schools had language immersion kindergarten and elementary school classes. This resulted, in some cases, in prior knowledge on the part of kindergarten teachers as to the characteristics of first grade teachers to which students would be assigned. Some schools had only one first grade teacher involved in the study, while others had as many as four. In one school, two kindergarten teachers who profiled students in Step 2 were now teaching first grade in that same school. This may have influenced class lists and retention decisions specifically, and may have created a Hawthorne effect generally. Table 7 summarizes the distribution of students and teachers, and outlines some important characteristics of the sample of first grade teachers.

Data Collection: First Grade Teacher Profiles

The purpose of Step 3 was to profile the first grade teachers of those pupils identified in Step 2. These first grade teacher profiles were constructed along several dimensions in order to obtain an

Table 7

Step 3 Distribution of Students and Teachers

School Code	Teacher Code		Number of Students in Sample
1	[1		2
1	[2		1
1	[3		1
1	[4		2
2	5		5
3	[6]	team + taught K.	8
3	[7]	teaching last year	
3	[8]	curriculum	8
3	[9]	sharing	
4	10		3
5	[11		7
5	[12		8
TOTAL 5	12		45

understanding and appreciation of teacher reaction to certain student attributes. From September 19th to September 27th, 1988, each first grade teacher was individually administered the sorting procedure developed and refined in Step 1. Each sorting procedure occurred within the school either in the teacher's classroom or in a quiet conference or staff room, and each occurred either at noon, after school, or during a free period.

Student characteristics from the Refined List of Student Descriptors (Appendix D) were typed on 10cm by 5cm white cards. The cards were shuffled and presented to each teacher as a deck. Seven yellow cards (6cm by 14cm) were laid out in front of each teacher on a table. At the bottom of each yellow card, from the card on the far left of the teacher to the card on the far right, one of the following rankings was typed: absolutely contributes to student success; strongly contributes to student success; mildly contributes to student success; does not contribute to student success or failure; mildly contributes to student failure; strongly contributes to student failure; absolutely contributes to student failure.

After a brief introduction, explanation, and review of first grade teacher involvement in the study, background teacher information was obtained. Then, having presented the deck of 63 student descriptor cards to the teacher, the examiner explained, "On each card is a word or phrase that describes a certain aspect of a student about this time, September, of first grade. For you as a first grade teacher, based on your interpretation of curriculum, your management of classroom proceedings, your teaching experience, and your evaluation of students, place each card where you feel it best belongs. Does it, for example, absolutely contribute to student failure? (Point to the yellow card on the table which contains that ranking.) Does it mildly contribute to student success? (Point to the yellow card on the table which contains that ranking.) Or does it, in your opinion, have nothing to do with success or failure in first grade? (Point to the yellow card on the table which contains that ranking.)"

Teachers were free to ask questions and clarify instructions. A common request was for elaboration of the terms success and failure. In keeping with anticipated criterion variables, success and failure were defined in terms of standardized achievement test results, first grade teacher evaluations, and parental assessment of student performance. (Refer to Chapter VI.)

On the reverse of each descriptor card a number from 1 to 63 was written. On the reverse of each yellow ranking card a number from 1 to 7 was written. A record keeping form was developed to record relevant background teacher information and record rankings of student descriptors (Appendix G). Teacher rankings of student descriptors were simply recorded by placing the number 1 to 7 on a line beside the number associated with the student descriptor. This method of recording teacher responses was adopted over recording procedures used in Step 1 which had proven excessively cumbersome.

Validity

The same concerns expressed in the validity section of Step 1 remain, but to a somewhat lesser extent. Because vague, ambiguous descriptors were omitted and/or clarified, it was assumed that teachers' rankings of student descriptors accurately represent their appreciation, preference, requirements, and tolerance for pupil characteristics.

Reliability

While reliability was not directly addressed in Step 3, it was assumed that clarification and refinement of items as well as reduction from a nine-point scale to a seven-point scale would improve upon the already acceptable teacher ranking consistency of Step 1.

Step 3: Presentation and Discussion of Outcome Data

Teacher ranking frequencies for each student descriptor were calculated. The most characteristic distribution of rankings occurred across four continuum positions, considerable variability on a seven-point scale. For example, the student descriptor "Healthy" ranged in ranking from "4" (does not contribute to student success or failure) to "7" (absolutely contributes to student success). Teachers' rankings sometimes tended to cluster around one specific rating as was the case with the descriptor "Appropriate clothing". Ten teachers rated this student characteristic as not contributing to success or failure, while two teachers believed it mildly contributed to success. Such obvious consistencies of teachers' rankings, however, were rare.

Variability of Step 3 teacher ranking frequencies appeared less pronounced than Step 1 teacher ranking variability. This was likely due to three differences between Step 1 and Step 3 data; Step 3 had almost half the subjects of Step 1; Step 3 employed a seven-point scale while Step 1 used a nine-point scale; and items were clarified and refined from Step 1 to Step 3. It may be that some of the variability between Step 1 teachers was due to lack of item clarity. Still, examination of Table 8 selected frequency data appears to demonstrate enough variability to infer that the 12 receiving first grade teachers differed

Table 8

Sample of Step 3 Frequency of Teacher Rankings of Student Descriptors

Descriptor	Ranking[a]	Frequency	Percentage
Healthy	4	1	8.3
	5	4	33.3
	6	6	50.0
	7	1	8.3
Appropriate clothing	4	10	83.3
	5	2	16.7
Confident	5	4	33.3
	6	5	41.7
	7	3	25.0
Emotionally stable and controlled	4	1	8.3
	5	2	16.7
	6	6	50.0
	7	3	25.0
Associates letters with their most frequent sounds	4	1	8.3
	5	4	33.3
	6	4	33.3
	7	3	25.0
Works well without adult supervision	4	1	8.3
	5	1	8.3
	6	7	58.3
	7	3	25.0
Can associate a printed word with a picture	4	2	16.7
	5	3	25.0
	6	6	50.0
	7	1	8.3
Stays on line when printing	4	6	50.0
	5	6	50.0

[a] 1 = absolutely contributes to student failure
2 = strongly contributes to student failure
3 = mildly contributes to student failure
4 = does not contribute to student success or failure
5 = mildly contributes to student success
6 = strongly contributes to student success
7 = absolutely contributes to student success

sufficiently from one another in terms of personal preferences, tolerances, biases, and requirements to differentially affect ecological congruence with students. (Refer to Appendix H for complete Step 3 frequency of teacher rankings of student descriptor data.)

Examination of Table 9, means and standard deviations of teacher rankings of student descriptors, yields a similar conclusion. While Step 1 and Step 3 means appeared approximately equivalent, Step 3 standard deviations seemed somewhat smaller than Step 1 standard deviations. This was likely due to the same three Step 1 - Step 3 differences previously outlined. Table 9 reveals that standard deviations of Step 3 teacher rankings of student descriptors, a metric of teacher variability, ranged from 1.47 to .29. The most characteristic standard deviations appeared to be just under one ranking position (i.e., .90). At this point, we anticipated that this represented sufficient variability across the sample of 12 first grade teachers to impact on ecological congruence with students.

Step 3: Summary and Perspective

In September of 1988, first grade teachers who received the 53 at-risk students identified and profiled the previous May (Step 2) were contacted. Due to natural attrition, the student sample was now 45 subjects, distributed among 12 first grade teachers. Each of these first grade teachers was profiled in terms of idiosyncratic interpretation of 63 student attributes.

Table 9

Step 3 Means and Standard Deviations of Teacher Rankings of Student Descriptors

Descriptor[a]	Mean[b] Rank	Std. Dev.	Descriptor[a]	Mean[b] Rank	Std. Dev.
Out of seat	3.17	1.47	Holds pencil	4.58	.67
Healthy	5.58	.79	Completes assign.	5.42	.79
Recalls details	5.83	.39	Inattentive	2.17	.94
Bashful	3.83	.58	Enjoys books	6.08	.79
Good hygiene	4.50	.52	Approp. clothing	4.17	.39
Negative attitude	1.83	1.03	Prints first name	4.75	.75
Parents interested	6.25	.75	Word - picture	5.50	.90
Positive attitude	6.50	.90	Prints on line	4.50	.52
Has colds	3.17	.72	Articulate	5.92	.90
Calm	4.92	.90	Inarticulate	3.08	1.00
Confident	5.92	.79	Reverses letters	3.50	.67
Emotionally stable	5.92	.90	Recog. spoken diff.	5.17	1.19
Overreacts	2.75	.87	Recog. written diff.	5.75	.87
Extroverted	4.42	.67	Copies correctly	5.00	.60
Communicates well	5.67	.78	Neat printing	4.42	.90
Letters-sounds	5.75	.96	Completes tasks	6.00	.60
Disorganized	2.83	.58	Clumsy	3.58	.51
Confuses colors	3.08	.67	Jump - skip	4.58	.67
Good workhabits	6.25	.96	Diff. remembering	2.50	1.00
Counts correctly	4.92	.67	Diff. understanding	2.25	1.05

Table 9 (Continued)

Step 3 Means and Standard Deviations of Teacher Rankings of Student Descriptors

Descriptor[a]	Mean[b] Rank	Std. Dev.	Descriptor[a]	Mean[b] Rank	Std. Dev.
Knows colors	5.17	.72	Repeats	5.33	.78
Disturbs others	2.92	.79	Initiates conver.	5.00	.74
Cooperative	5.50	1.00	Follows directions	5.58	.79
Disruptive	2.58	1.16	Dirty	3.58	.67
Works unsupervised	6.00	.85	Clean	4.33	.49
Uncomfort. new sit.	3.08	1.00	Knows alphabet	5.75	.87
5-1/2 years in first grade	2.58	.67	English is a second language	3.25	.45
6.0 years in first grade	5.67	.78	From a single parent family	3.83	.39
6-1/2 years in first grade	6.00	.74	On social assistance	3.67	.49
Male	3.92	.29	Younger siblings	4.17	.39
Female	4.08	.29	Only child	4.08	.67
Parents profess.	4.42	.67			

[a] Refer to Appendix D for unabbreviated descriptors.

[b] Refer to Table 8 for description of ranking continuum.

Frequencies and standard deviations of teacher rankings of these student attributes tended to support the conclusion that the 12 teachers in the sample were different from each other. This was a critical point regarding final interactional analyses and interpretations. If first grade teachers were very similar to each other, it may be that ecological fit with students would be difficult to differentiate from ecological discordance. When teachers were very different from one another, however, as seemed to be the case in both Step 1 and Step 3, confidence was generated that these individual differences in preferences, requirements, tolerances, and biases may interact with student characteristics to produce discernibly different outcomes.

Information on two components of a complex interactional academic phenomena, first grade, was now in place. Profiles of at-risk students and corresponding profiles of their first grade teachers were complete. The entire school year must pass. Reciprocal exchanges, covert expectancies, and subtle teacher-student interactions will unfold daily. By the end of first grade, clearly, each teacher will have made a lasting impact on her students. To evaluate certain aspects of that impact, end of first grade achievement/performance for the sample of at-risk students must be assessed.

CHAPTER VI

EVALUATING FIRST GRADE STUDENT ACHIEVEMENT: STEP 4

During May of 1988, a group of at-risk kindergarten students were identified and profiled (Step 2). During September of 1988, each of those student's first grade teachers were profiled in terms of preferences, bias, expectancies, requirements, and beliefs (Step 3). Before the impact of interaction between pupil profiles and teacher profiles can be assessed, first grade student achievement required evaluation.

Step 4: Methods and Procedures

During late April of 1989, each first grade teacher was contacted; changes which related to the study were noted, and Step 4 instruments and data gathering techniques were reviewed.

Subjects

The original sample of 12 teachers had changed somewhat, but, fortunately, not enough to jeopardize ecological analyses. Teachers code numbers 08 and 09 had shared the curriculum for one first grade classroom all year. Since teacher code number 08 taught only one day a week, and on that day taught mainly options (i.e., art) and language arts follow-up (i.e., creative writing, review of concepts) specified by teacher number 09, it was reasoned that her profile was not critical to analyses. Also, the two teachers who had team taught (code numbers 10 and 11) were no longer teaching together. Teacher number 10 had been replaced by a substitute during mid-April. At that time the teamed group of students was divided giving number 10's substitute 15 very low students (as defined by teachers number 10 and 11).

As well as teacher code number 10, teacher 12 had also been replaced by a substitute during late April. Both substitutes (as well as teachers number 10 and 12 via telephone) assured the researcher that report card marks, special education placements, and grade retention decisions were already firmly in place. It was reasoned, consequently, that teacher number 10 and teacher number 12 profiles could still be used in evaluating ecological congruence.

As anticipated, the sample of students had also been reduced. Five students had moved and one child, it was now discovered, had been inappropriately placed in the study. She had never satisfied Step 2 inclusion criteria in as much as she was in a kindergarten class in the morning, and one of our target first grade classrooms in the afternoon. Since teacher code number 05 had no remaining sample subjects, final analysis would involve 10 first grade teachers and 39 at-risk first grade pupils. Table 10 presents a visual summary of certain relevant sample characteristics.

On several occasions during Step 4 procedures, numerous first grade teachers asked why certain specific students were not included in the

Table 10

Step 4 Distribution of Students

	Teacher Code Number		Number of Students in Sample
	01		7
	02		6
	03		2
	04		1
	05		0
	06		1
	07		5
	08 (09)	(09 taught on Fridays, mostly) (options. It was reasoned) (that her profile was not) (critical to analyses)	8
	10	(10 and 11 had previously) (team taught. When #10 was) (replaced by a substitute) ([mid-April], pupils were) (divided, giving the substi-) (tute 15 very low students)	3
	11		3
	12	(replaced by substitute) (during late April)	3
Final number of teachers remaining in sample	10	Final number of students remaining in sample	39

at-risk sample. This seemed important in terms of Step 2 identification procedure validity. That is to say, teachers had many very low functioning students (i.e., recommended to repeat first grade, receiving Resource Room instruction, referred for psychological evaluation) who were not part of the at-risk sample. Casual discussion with teachers revealed that many of these low students were excluded from the sample for legitimate reasons. Many such students had not attended kindergarten in one of the target school. Also, some parents who initially agreed to have their children in kindergarten for a second year (children who did not satisfy the inclusion criterion of being promoted to first grade and who, consequently, were not profiled) had changed their minds and, to the schools' surprise, placed their children in first grade in September of 1988. Additionally, a few of these low functioning children had been in first grade the previous year and thus were unidentifiable by kindergarten teachers.

Unfortunately, several children who in retrospect should have been included in the sample of at-risk students were excluded. The only reason for their exclusion, it seemed, was kindergarten teacher identification error. That is, kindergarten teachers did not identify these students as at-risk when, in fact, they went on to experience considerable difficulty in first grade. Predictively speaking these children were false negatives, expected to perform adequately when they actually performed inadequately.

Superficially this may appear to reflect poorly on Step 2 identification validity. In truth, this is quite consistent with ecological assumptions. All that was required from Step 2 identification procedures was an adequate sample of at-risk students. Because teachers are not perfectly accurate predictors, the sample, no doubt, was characterized by some instances of false positive and false negative errors. Since it was maintained that student-teacher "goodness-of-fit" is critically related to student performance and teacher evaluation of student achievement, the fit between kindergarten teacher and kindergarten student should equally be reflected in students that kindergarten teachers identified as at-risk. Since the central focus of Step 2 identification procedures was a reduced and selective profiling of students, necessary primarily because of time and resource limitations, occasional predictive errors were not of concern.

Instruments

To evaluate first grade student achievement/performance, three distinct instruments were employed. It was reasoned that first grade functioning could most thoroughly be assessed if a standardized achievement test, teacher assessment, and parental evaluation were all utilized.

Stanford Achievement Test

Because of excellent reviews (Salvia & Ysseldyke, 1981, pp. 156-168) as well as relative brevity, the Stanford Achievement Test (SAT) was selected as the independent or objective measure of student achievement. The Reading Comprehension subtest from Form E and the Mathematics Computation and Application subtest from Form A were combined to form individual student booklets.

Teacher Evaluation of Student Achievement

Developed specifically for this study, a teacher-completed rating scale (Appendix I) was used to summarize and quantify teacher assessment of at-risk first grade student achievement/performance. Twenty items addressed student language arts and mathematics achievement, social competence, emotional development, behavioral compliance, and teacher recommendations. A five-point scale was used where a rating of "1" always indicated very poor performance, and a rating of "5" always indicated excellent performance. Thus, perfect student functioning would hypothetically receive a total evaluation of 100 (20 items X a ranking of "5" on each item); average student performance, a total rating of 60 (20 items X a ranking of "3" on each item).

As a measure of teacher tolerance and possibly relevant classroom characteristics, the "Step 4: Teacher Evaluation of Student Achievement" rating scale also asked two important and consequential questions; the number of students each teacher referred to any sort of special education or assessment that year, and the number of students recommended for grade retention that year. It was reasoned that such information may be related to subsequent analyses and/or interpretation of data.

Parental Evaluation of Student Performance

A rating scale that served to structure a telephone interview aimed at summarizing and quantifying parents' perceptions or evaluations of their at-risk (unknown to them in many cases) first grade children's school functioning was developed specifically for this study (Appendix J). Ten items assessed student happiness, social competence, and reading and mathematics achievement. A five-point scale was used where a rating of "1" consistently indicated very poor performance, and a rating of "5" always indicated excellent performance. Thus, parental perception of perfect child functioning at school would hypothetically receive a total evaluation score of 50 (10 items X a ranking of "5" on each item); average student performance, a total rating of 30 (10 items X a ranking of "3" on each item).

On the "Step 4: Parental Evaluation of Student Performance" rating scale form, space was provided to note special circumstances, (i.e., ESL) and relevant background information (i.e., parents' names) prior to telephone contact. Space was also provided to note parents' comments and reactions to the study.

Data Collection

Collecting criterion or outcome data for the sample of 39 at-risk first grade pupils occurred in several stages and involved the researcher, all first grade teachers, and most pupils' parents.

Stanford Achievement Test

During the late April meetings teachers were asked if they would administer the SAT to their entire first grade classes. All teachers agreed. The researcher explained that having achievement test results for entire classes, and not only for targeted pupils, would allow for more meaningful analyses. At those same April meetings, directions for administration as well as actual test booklets were given to each teacher. Teachers were instructed to follow directions carefully and to administer the test "not prior to May 1st and not later than May 15th."

By May 15th all tests were collected. It was discovered that four classes, all in the same school, had not completed the mathematics subtest, and that one target pupil had not completed any of the test. Tests were marked, data recorded, and individual classroom data sheets prepared for each teacher (Appendix K). From May 25th to June 1st each first grade teacher was met with again at which time SAT booklets were returned, class results were presented and discussed, and data collection on teacher and parental evaluation of student achievement begun.

Teacher Evaluation of Student Achievement

In all cases the first grade teacher whose profile was to be compared to the corresponding at-risk first grade student completed evaluation of student achievement rating scales (Appendix I). Since two teachers were on maternity leave, data collection did not always occur in the schools. One teacher completed rating scales via telephone; another completed them in her home via her teacher's aide who was also her close friend. The remaining teachers either completed the rating scales during May 25th to June 1st meetings, or within a few days following those meetings. The researcher subsequently returned to the schools to collect some of these teacher evaluation forms, always prior to June 1st.

Parental Evaluation of Student Performance

During May 25th to June 1st meetings, the semi-structured telephone interview aspect of Step 4 was reviewed with teachers. In the event that these interviews may in any way affect students or teachers, it was reasoned that teachers should be clearly aware of research study specifics regarding parental evaluation of student performance. As well, teachers provided necessary background and special circumstances information. In a few cases other individuals (i.e., school secretary, teacher's aid) provided some limited input (i.e., telephone numbers).

From June 1st to June 8th parents were contacted on the telephone, most frequently during early evening. Three parents were unwilling to participate; after four unsuccessful attempts to communicate with a Chinese grandmother, one ESL student's parents did not participate. Of the remaining 35 semi-structured telephone interviews, 23 were completed by mothers and 12 were completed by fathers. In general parents were eager to discuss their children's school performance. They frequently added much more to the interview than was required. Consequently, the briefest interview lasted four minutes, while the longest lasted 13 minutes. The introduction and questions outlined in "Step 4: Parental Evaluation of Student Performance" (Appendix K) were in all cases strictly adhered to.

Step 4: Presentation and Discussion of Outcome Data

School performance and achievement as measured by the SAT, teacher evaluation, and parental evaluation of the sample of at-risk children proved worth examination. Analyses of relationships between these three outcome or criterion measures, consequently, contributed to peripheral explanation.

Stanford Achievement Test

Table 11 presents means and standard deviations of SAT subscores for each first grade class involved in the study. Based on a total of 250 students, Reading Comprehension subtest raw scores ranged from 0 to 40 (of 40 possible), with a mean raw score of 28.5. Using SAT national norms, total group mean grade equivalent was 2.01. Since all tests were administered during the first two weeks of May, expected mean grade equivalent would be about 1.85. This seemed to suggest that the 250 Alberta students who completed the SAT Reading Comprehension subtest performed slightly better than the test's normative sample. Within this group, however, reading comprehension ranged from 0.1 (first month of kindergarten) to 4.2. A very similar pattern of achievement was evident in the Mathematics Computation and Application subtest. (Since four classes did not complete this subtest, analyses involved 171 not 250 students.)

Examination of Table 11 also reveals that mean achievement differed from class to class. Teacher code number 10's class, for example,

Table 11

Class Means and Standard Deviations for Stanford Achievement Test

Teacher No.	Read. Comp. Raw Score	Read. Comp. Gr. Equiv.	Read. Comp. Percentile	Math Raw Score	Math Gr. Equiv.	Math Percentile
01	26.13 9.03	1.79 0.82	44.48 27.72	20.70 5.14	2.09 0.70	52.00 25.50
02	32.86 6.93	2.13 0.67	62.36 21.10	21.82 5.09	2.23 0.71	57.64 24.77
03	26.27 10.36	1.77 0.93	44.36 29.93	6.43 8.64	0.47 0.98	12.57 10.62
04	26.30 9.21	1.82 0.87	45.35 28.64			
05	31.20 7.68	2.29 1.11	59.80 26.63			
06	27.36 11.22	2.00 1.05	50.95 32.66			
07	24.08 11.33	1.62 0.90	40.38 29.42	16.85 7.32	1.63 0.87	38.27 29.16
08-09	34.45 5.35	2.45 0.81	69.50 19.91	23.10 5.80	2.45 0.85	65.05 28.07
10	14.00 8.54	0.94 0.54	14.86 18.43	14.33 5.67	1.35 0.60	26.33 20.01
11	30.53 8.67	2.14 0.90	57.38 28.20	21.67 3.56	2.14 0.43	55.92 19.34
12	35.52 4.80	2.68 0.94	73.86 19.44	23.86 5.12	2.59 0.84	67.90 25.94
TOTAL GROUP (250 Students)	28.50 10.05	2.01 0.97	52.50 29.62 (171) (Students)	20.24 6.74	2.06 0.87	52.24 28.71
Range	0-40	0.1-4.2	1.0-97	3.0-31	0.1-4.5	1.0-99

obtained a mean reading comprehension grade equivalent of only 0.94 (late kindergarten functioning). This was the class, it should be noted, which was created from the 15 lowest functioning previously team-taught students. This low mean achievement score did not come as a surprise to the substitute teacher of that class. The highest mean reading comprehension grade equivalent, on the other hand, was 2.45 which occurred in teachers' 08-09 class (one teacher taught four days per week while the other taught one day per week). It seemed likely that differences in group achievement means were the consequence of many complex interactional factors, some concerned with initial group differences, some concerned with teacher differences.

Table 12 provides raw scores, grade equivalents, and percentiles for SAT reading comprehension and mathematics subtests for each student in the at-risk sample. Mean achievement for at-risk students (raw score 28.37) was very similar to total group mean achievement (raw score 28.50). However, the range of scores within the risk group (9-40) was less than the range of scores in the total group (0-40). This seemed to suggest, as previously noted, that some very low functioning students from the total group were not included in the at-risk sample.

Teacher Evaluation of At-Risk Student Achievement

Table 13 presents nine scores for each at-risk student based on teacher evaluations. Student subtest scores with an average of less than 3 on a 5-point scale in language arts, mathematics, social

Table 12

Standford Achievement Test Results For At-Risk Students

	Read. Comp. Raw Score	Read. Comp. Gr. Equiv.	Read Comp %ile	Math Raw Score	Math Gr. Equiv.	Math %ile
01	31	1.8	53	25	2.6	74
02	MOVED					
03	23	1.4	34	17	1.6	32
04	30	1.7	50	26	2.7	82
05	18	1.2	21	15	1.5	24
06	MOVED					
07	MOVED					
08	KINDERGARTEN AM, GRADE 1 PM					
09	30	1.7	50	19	1.8	40
10	9	0.5	1	4	0.1	1
11	40	4.2	97	21	2.0	50
12	17	1.2	18	18	1.7	36
13	38	2.7	82	—	—	—
14	36	2.2	70	24	2.4	68
15	40	4.2	97	26	2.7	82
16	20	1.3	26	23	2.2	62
17	38	2.7	82	16	1.6	28
18	13	1.0	8	12	1.2	16
19	MOVED					
20	36	2.2	70	23	2.2	62
21	MOVED					
22	36	2.2	70	24	2.4	68
23	15	1.1	12	22	2.1	56
24	—	—	—	—	—	—
25	29	1.7	48	8	0.6	6
26	38	2.7	82	28	3.0	92
27	MOVED					
28	25	1.5	39	—	—	—
29	17	1.2	18	16	1.6	28
30	38	2.7	82	25	2.6	74
31	35	2.0	66	21	2.0	50
32	32	1.8	56	21	2.0	46
33	MOVED					
34	MOVED					
35	36	2.2	70	25	2.6	74
36	14	1.0	10	3	0.1	1
37	36	2.2	70	26	2.7	82
38	13	1.0	8	23	2.2	62
39	MOVED					
40	36	2.2	70	18	1.7	36
41	MOVED					
42	MOVED					
43	25	1.5	39	21	2.0	50
44	29	1.7	48	16	1.6	28
45	21	1.3	29	18	1.7	36
46	34	2.0	62	24	2.4	68
47	33	1.9	58	18	1.7	36
48	MOVED					
49	34	2.0	62	19	1.8	40
50	MOVED					
51	38	2.7	82	25	2.6	74
52	22	1.4	31	11	1.0	12
53	23	1.4	34	18	1.7	36
Total	38	38	38	35	35	35
Mean	28.37	1.89	50.13	19.42	1.90	47.56
Std. Dev.	9.13	0.785	26.81	6.049	0.684	24.70
Range	9-40	0.5-4.2	1.0-97	8-28	0.1-3.0	1.0-92

Table 13

Teacher Evaluation of At-Risk Student Achievement

	Lang. Arts /25	Math /20	Soc. Comp. /10	Emot. Dev. /10	Behav. /15	Recomm. /20	Total Acad. /45	Total SEB[b] /35	Total Eval. /100
01	17[a]	18	9	10	14	18	35	33	86
02	MOVED								
03	15	12	6[a]	6	13	17	27	25	69
04	16	12	9	8	11	18	28	28	74
05	7*	11*	8	8	10	10*	18	26	54
06	MOVED								
07	MOVED								
08	KINDERGARTEN AM, GRADE 1 PM								
09	9*	11*	8	6[a]	8*	9*	20	22	51
10	7*	7*	6[a]	6	11	4*	14	23	41
11	25	19	9	10	15	20	44	34	98
12	5*	12	3*	5*	6*	5*	17	14	36
13	19	12	9	10	11	18	31	30	79
14	19	18	7	8	9	20	37	24	81
15	19	20	6[a]	8	9	20	39	23	73
16	11*	11*	4*	4*	6*	10*	22	14	46
17	20	16	9	9	13	19	36	31	86
18	9*	13	5*	4*	6*	9*	21	15	45
19	MOVED								
20	12*	14	6	5*	6*	12[a]	26	17	55
21	MOVED								
22	19	16	8	7	10	20	35	25	80
23	7*	13[a]	8	7	10[a]	10*	20	25	55
24	12*	12	3*	5*	6*	15[a]	24	14	53
25	18	19	4*	8	9	18	37	21	76
26	18	20	10	10	15	19	38	35	92
27	MOVED								
28	11*	12[a]	5*	4*	8[a]	10*	23	17	50
29	8*	12[a]	7	8	12	7*	20	27	54
30	21	20	10	8	15	20	41	33	94
31	15	13	5*	6	9	18	28	20	66
32	9*	12	9	7	11[a]	13[a]	21	27	61
33	MOVED								
34	MOVED								
35	15	13	9	6	13	18	28	28	74
36	6*	7*	6	7	13	6*	13	26	45
37	18	15	6[a]	6	11	19	33	23	75
38	12*	11*	5*	5*	6*	13[a]	23	16	52
39	MOVED								
40	13*	18	7	9	10[a]	18	31	26	75
41	MOVED								
42	MOVED								
43	19	20	6[a]	8	9	15	39	23	77
44	7*	6*	10	6	12	9*	13	28	50
45	5*	8*	3*	9	7*	6*	13	19	38
46	11*	13	6	6	11	16	24	23	63
47	9*	12[a]	8	5*	12[a]	8*	21	25	54
48	MOVED								
49	19	15	4*	5*	9	18	34	18	70
50	MOVED								
51	16	15	3*	4*	6*	18	31	13	62
52	11*	18	7	8	10	15[a]	29	25	69
53	7*	8*	4*	6	6*	6*	15	16	37
Total	39	39	39	39	39	39	39	39	39
Mean	13.23	13.49	6.64	6.87	9.92	14.26	26.82	23.95	63.26
Std. Dev.	5.24	4.29	2.10	1.79	2.83	4.98	8.77	6.11	18.51
Range	5-25	3-21	3-10	4-10	5-15	4-20	13-44	13-36	7-98

* Low Performance/Achievement

[a] Low Item/s Hidden by Average of Category

[b] Total Social-Emotional-Behavioral Evaluation

competence, emotional development, behavioral compliance, and/or teacher recommendations are marked with an asterisk. Subtest scores that appear average, but that actually contain at least one less than average rating on a particular item are marked with a superscript lowercase letter a. As visual scrutiny of Table 13 reveals, student achievement was extremely varied; some students had no school problems, some had many, and some had only certain specific problems, according to teachers.

Table 13 also displays group means, standard deviations, and ranges for each of the nine teacher evaluation scores. Mean language arts achievement was 13.23 out of a possible 25, a score which could be considered less than average (5 items X a ranking of "3" on each item = 15). The standard deviation (5.24) and range (5-25) for language arts subscores both appeared large. Much the same could be said of standard deviations and ranges for remaining scores. The remaining means, however, all reflected average student achievement/performance according to teachers.

Parental Evaluation of At-Risk Student Performance

Table 14 presents seven scores for 35 of the 39 at-risk students based on parental evaluation of school achievement. As with Table 13, student scores clearly less than average are marked with an asterisk, and hidden low items are marked with a superscript lowercase a. As can be seen, 19/35 students demonstrated no school problems, 13/35 showed a few problems, and 3/35 evidenced considerable school difficulties according to their parents.

Table 14

Parental Evaluation of At-Risk Student Performance

	Student Happiness /10	Social Comp. /15	Reading /10	Math /10	Total Soc-Emo. /25	Total Acad. /25	Total Eval. /50
01	10	11	10	9	21	24	45
02	MOVED						
03	CHOSE NOT TO PARTICIPATE						
04	8	13	10	10	21	25	46
05	10	11	6	7	22	18	40
06	MOVED						
07	MOVED						
08	KINDERGARTEN AM, GRADE 1 PM						
09	8	11	6	10	19	19	38
10	8	10[a]	2*	5*	18	8	26
11	10	11	8	9	21	22	43
12	7	7*	6	10	14	19	33
13	6	11	7	10	17	20	37
14	CHOSE NOT TO PARTICIPATE						
15	9	10[a]	8	8	19	21	40
16	8	8*	9	8	16	22	38
17	9	13	9	9	22	23	45
18	6	7*	6	7	13	15	28
19	MOVED						
20	10	11	10	10	21	22	43
21	MOVED						
22	6	13	9	8	19	21	40
23	9	14	7	10	23	21	44
24	6	12	8	8	18	21	39
25	5*	8*	10	9	13	24	37
26	6	15	10	10	21	25	46
27	MOVED						
28	10	11	7	10	21	22	43
29	10	10	6	10	20	21	41
30	CHOSE NOT TO PARTICIPATE						
31	5*	9[a]	6	9	14	18	32
32	7	13	5*	9	20	17	37
33	MOVED						
34	MOVED						
35	10	14	8	10	24	23	47
36	10	11	6	8	22	19	41
37	UNABLE TO COMMMUNICATE						
38	5*	7*	6	9	12	17	29
39	MOVED						
40	7	9	7	10	16	21	37
41	MOVED						
42	MOVED						
43	4*	6*	5*	8	10	16	26
44	7	14	6	8	21	17	38
45	8	7*	3*	5*	15	11	26
46	8	13	8	8	21	20	41
47	4*	13	6	10	17	21	38
48	MOVED						
49	3*	7*	10	9	10	24	34
50	MOVED						
51	8	8*	10	10	16	25	41
52	10	12	4*	8	22	17	39
53	10	13	5*	7[a]	23	17	35
Total	35	35	35	35	35	35	35
Mean	7.63	10.63	7.26	8.97	18.34	19.83	38.09
Std. Dev.	2.07	2.55	2.16	2.20	3.83	3.76	5.87
Range	3-10	6-15	2-10	5-19	10-24	8-25	26-47

* Low Performance/Achievement [a] Low Item/s Hidden by Average of Category

Correlational Analyses of Student Achievement

Many Teacher Evaluation of Student Achievement scores and subscores significantly correlated with students' SAT subscores. Teacher Language Arts evaluation scores, for example, correlated .73 ($p < .001$) with SAT Reading Comprehension raw scores. Teacher recommendations were correlated with both SAT scores ($r = .57$, $p < .01$; $r = .74$, $p < .001$), with the larger correlation associated with Reading Comprehension. While some moderate to mild correlations between teachers' evaluation of students' Social Competence, Emotional Development, and Behavioral Compliance with SAT Reading Comprehension scores were apparent, relationships between non-academic evaluations and SAT mathematics scores were not found. Table 15 presents all correlations between SAT scores and teacher evaluation of at-risk student achievement.

Table 16 provides correlations between SAT raw scores and parents' evaluations of their at-risk children. As can be seen, parents' perceptions of their children's happiness at school seemed particularly unrelated to SAT scores. Parents' evaluation of mathematics ability was likewise uncorrelated with SAT scores, even with mathematics scores. Parental perceptions of student reading ability was moderately related to both SAT scores.

Correlations between teachers' evaluations of student functioning and parents' evaluations of student functioning are presented in Table 17. While relationships were not always strong, some interesting associations were apparent. Teacher recommendations, for example, were

Table 15

Correlations Between SAT Raw Scores and Teacher Evaluation

	Stanford Achievement Test	
Teacher	Reading Comprehension	Mathematics
Language Arts	.73***	.47**
Mathematics	.60***	.40**
Social Competence	.35*	.23
Emotional Development	.30*	.06
Behavioral Compliance	.34*	.03
Recommendations	.73***	.57**
Total Academic	.71***	.47*
Total Social-Emotional-Behavioral	.25	.09
Total Evaluation	.71***	.41**

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 16

SAT Raw Score and Parental Judgement of Achievement Correlations

Parent	Stanford Achievement Test	
	Reading Comprehension	Mathematics
Student Happiness	-.12	-.05
Social Competence	.32*	.19
Reading	.51**	.51**
Mathematics	.14	.26
Total Social-Emotional	.12	.07
Total Academic	.61***	.50**
Total Evaluation	.48**	.38*

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 17

Correlations Between Teacher and Parent Evaluations of Achievement

	Parent						
Teacher	Student Happiness	Social Competence	Reading	Mathe-matics	Total S-E [a]	Total Academic	Total Evaluation
Language Arts	-.22	.01	.53**	.02	-.14	.57***	.29*
Mathematics	-.11	.05	.35*	-.12	-.06	.49**	.30*
Social Competence	.20	.67***	.05	.12	.55***	.22	.52**
Emotional Development	.18	.21	-.01	-.04	.23	.11	.22
Behavioral Compliance	.19	.58***	.02	-.10	.48**	.26	.50**
Recommen-dations	-.22	.02	.66***	.36*	-.12	.64***	.36*
Total Academic	-.19	-.01	.51**	.04	-.14	.58***	.31*
Total SEB [b]	.17	.38*	.14	.41**	.37*	.20	.38*
Total Evaluation	-.07	.31*	.34*	-.17	.14	.53**	.45**

* $p < .05$.

** $p < .01$.

*** $p < .001$.

[a] Parent Total Social-Emotional Evaluation.

[b] Teacher Total Social-Emotional-Behavioral Evaluation.

correlated with parents' evaluations of children's reading (r = .66, p < .001), mathematics (r = .36, p < .05), total academic achievement (r = .64, p < .001), and overall school functioning (r = .36, p < .05).

The methods of teacher and parent evaluations of student at-school functioning, developed specifically for this study, lacked previous validation and examination. To explore these evaluative techniques, examination of within-instrument relationships was undertaken. Correlations among teacher evaluation subscores (Appendix L) and parent evaluation subscores (Appendix M) revealed a number of strong relationships, some of which may reflect favorably on the validity of instruments. For example, teacher recommendations correlated .73, p < .001 with teacher total evaluation, an expected relationship given a valid measure of such teacher evaluations.

Step 4: Summary and Perspective

During May of 1989, when the sample of students was just completing first grade, evaluations of achievement were obtained. In an attempt to define and assess first grade functioning in the broadest sense, three achievement indices were employed; the SAT, Teacher Evaluation of Student Achievement, and Parental Evaluation of Student Performance. Data collection took more than one month, and involved the researcher, first grade teachers and students' parents.

Based on SAT results it seemed that some of the 39 at-risk students were realizing above average achievement in reading and mathematics, some were performing adequately, and others were functioning at a very low level. This seemed also to be very much the case with teacher evaluations of at-risk students. Parental evaluations, however, did not appear to reflect as many and as intense student difficulties as did the other two dimensions of evaluation.

Correlational analyses revealed numerous relationships between and within the three evaluative dimensions of student achievement. While examination of these relationships was interesting, the central focus of this study remained to be addressed. Thus far the consequences of data collection had been referred to as "outcome data", and not as results. This was quite deliberate. While presentations and interpretations of Steps 1, 2, 3, and 4 outcome data sometimes proved consequential in and of themselves, the primary concern was analysis and interpretation of the interaction between Steps 2, 3, and 4 outcome data. Finally, analyses and interpretation of ecological congruence and its impact on at-risk first grade student achievement/performance were about to occur.

CHAPTER VII

RESULTS: ECOLOGICAL CONGRUENCE AND PREDICTIVE ACCURACY

In trying to evaluate relative significance of ecological findings, two critical points must be articulated. First, the sample of students employed here was very different from the sorts of samples virtually all traditional predictive studies have utilized. While conventional predictive indices have consistently been validated on "normal" samples of students, ecological predictive metrics were applied to what was conceptualized as marginal students, students suspected of constituting the vast majority of kindergarten screening predictive errors.
In truth, however, the kindergarten student identification procedures used may have served to increase the common amount of variance among the sample, thereby exaggerating the true strength of findings. Secondly, since this ecological study was without precedent, particularly in terms of conceptualizing, assessing, and calculating pupil-teacher congruence, and since it was therefore necessary to conceptualize, develop, and refine many aspects of data collection as well as all ecological congruence metrics, the significance of results must be considered exploratory and preliminary.

Conceptualizing and Calculating Ecological Congruence

It could be argued that trying to represent something as complex as pupil-teacher interaction or ecological congruence with a few digits was reductionist, to say the least. While that may well be, in truth educational constructs that transcend quantification are not readily endorsed nor embraced by practitioners nor researchers. Equally, if it is hoped, in any respect, to predictively validate and practically implement ecological principles, a metric of ecological congruence must be developed.

In trying to establish appropriate comparisons of student profiles with teacher profiles, a number of indices or metrics were developed. That is to say, conceptualizations and calculations of ways in which teacher and pupil profile data interact were developed and explored. Fourteen indices of teacher-student profile compatability, or Ecological Congruence Metrics, ensued. Table 18 briefly summarizes the arithmetic calculations involved in these metrics, and Appendix N provides their conceptual rationale and a more detailed discussion of their calculation.

Except for Metric A, which is not a genuine interval scale and therefore not legitimately subject to correlational analyses, correlations among metrics were calculated. As Table 19 reveals, metrics showed a definite pattern of relationships of various strengths. Reasoning that highly correlated metrics ($r \geq .85$) were redundant, Metrics D, E, G, I, K, L, and N were deleted from subsequent analyses. Thus, seven Ecological Congruence Metrics (A, B, C, F, H, J, M), each based on various conceptual rationales and differing mathematical calculations, and none that strongly related to one another remained. These seven metrics were analyzed in terms of predictive

Table 18

Summary of Ecological Congruence Metrics Calculations

Metric	Arithmetic Calculations
A	Sum of absolute value of teacher item scores minus absolute value of student item scores
B	Sum of absolute value of teacher item scores minus absolute value of student item scores divided by 63 - Teacher number of 0 responses.
C	Number of negative differences between teacher item scores and corresponding inverted student item scores.
D	Number of positive differences between teacher item scores and corresponding inverted student item scores.
E	Sum of negative differences between teacher item scores and corresponding inverted student item scores.
F	Sum of positive differences between teacher item scores and corresponding inverted student item scores.
G	Total of signed differences between teacher item scores and corresponding inverted student item scores.
H	Number of positive differences between collapsed teacher item scores and corresponding student item scores.
I	Sum of positive differences between collapsed teacher item scores and corresponding student item scores.
J	Number of negative differences between collapsed teacher item scores and corresponding student item scores.
K	Sum of negative differences between collapsed teacher item scores and corresponding student item scores.
L	Number of positive plus number of negative differences between collapsed teacher item scores and corresponding student item scores.
M	Total of signed differences between collapsed teacher item scores and corresponding student item scores.
N	Summation of absolute differences between collapsed teacher item score and corresponding student item scores.

Table 19

Correlations Among Ecological Congruence Metrics

	Metric C	Metric D	Metric E	Metric F	Metric G	Metric H	Metric I	Metric J	Metric K	Metric L	Metric M	Metric N
Metric B	.39**	-.40**	-.27*			.72***	.73**	.62***	-.62***	.78***		.82***
Metric C		-.99***	-.86***	-.78***	-.93***						.42**	
Metric D			.85***	.79***	.93***						-.41**	
Metric E				.58***	.86***						-.35*	
Metric F					.87***							
Metric G											-.31*	
Metric H							.96***	.40**	-.41**	.87***	.64***	.85***
Metric I								.45**	-.45**	.86***	.60***	.87***
Metric J									-.98***	.78***	-.39**	.79***
Metric K										-.78***	.41**	-.81***
Metric L												.97***
Metric M												

* p < .05
** p < .01
*** p < .001

NOTE: Refer to Table 18 for metric definition.

hit rates, correlations to achievement, and one-way analysis of variance.

Ecological Congruence Metrics Predictive Hit Rate

Because accurate versus inaccurate predictions are directly addressed, predictive hit rates for a sample of Congruence Metrics were calculated. Reasoning pupil-teacher fit may be more critical for some teachers than for others, and consequently that congruence metrics may be more predictively accurate for some teachers than for others, hit rates for Metric A were calculated for each individual teacher using a number of outcome variables. As Table 20 illustrates, predictive accuracy for Metric A ranged from 100% to 0% (mode 100%) across the sample of teachers. Using an Ecological Congruence Metric A cut off score of 50, and defining first grade failure as an end of year SAT Reading Comprehension grade equivalent of equal to or less than 1.7, student success and failure were consistently identifiable for four teachers, identifiable to varying degrees for five teachers, and not identifiable at all for one teacher.

Table 21 presents much the same pattern of individual teacher hit rates, and virtually equivalent overall Metric A predictive accuracy. Using a score of less than 27 on Teacher Total Academic Evaluation, Metric A was able to identify first grade failure consistently for four teachers, to varying degrees for five teachers, and not at all for one teacher. While Table 21 predictive distribution appears very similar to Table 20 distribution, it should be noted that quite different

Table 20

Ecological Congruence Metric A Hit Rate For Reading Comprehension

Teacher Code Number	Hits (% for teacher)	Misses (% for teacher)
01	7 (100%)	0 (0%)
02	6 (100%)	0 (0%)
03	1 (50%)	1 (50%)
04	1 (100%)	0 (0%)
06	1 (100%)	0 (0%)
07	2 (40%)	3 (60%)
08	5 (62.5%)	3 (37.5%)
10 (no data for one pupil)	1 (50%)	1 (50%)
11	0 (0%)	3 (100%)
12	1 (33.3%)	2 (66.6%)
Total	25	13
Percentage of Sample	65.8%	34.2%

NOTE: Reading failure was defined as a Reading Comprehension Grade Equivalent of ≤ 1.7. Ecological Discordance was defined as a Metric A score of more than 50.

Table 21

Ecological Congruence Metric A Hit Rate for Teacher Total Academic Evaluation

Teacher Code Number	Hits (% for teacher)	Misses (% for teacher)
01	7 (100%)	0 (0%)
02	4 (66.6%)	2 (33.3%)
03	1 (50%)	1 (50%)
04	1 (100%)	0 (0%)
06	1 (100%)	0 (0%)
07	3 (60%)	2 (40%)
08	8 (100%)	o (0%)
10	0 (0%)	3 (100%)
11	1 (33.3%)	2 (66.6%)
12	1 (33.3%)	2 (66.6%)
Total	27	12
Percentage of Sample	69.2%	30.8%

NOTE: Failure was defined as a Teacher Total Academic Evaluation score of less than 27. Ecological discordance was defined as a Metric A score of more than 60.

individual teachers were associated with accurate versus inaccurate predictions.

Since teacher recommendations are often ultimately consequential in terms of grade retention, remedial intervention, and special needs placement, the predictive accuracy of Ecological Congruence Metric A for Teacher Recommendation scores of less than or equal to 12 seemed of particular interest. As Table 22 reveals the overall predictive strength of Metric A (79.5%) was considerably improved. Intuitively, it seemed logical that pupil-teacher congruence should most strongly predict teacher recommendations for students. Metric predictive validity again appeared relative to individual teachers.

Table 23 provides a representational sample of overall (across teachers) predictive hit rates for congruence metrics. Two observations are importantly noted. First, hit rates demonstrated some consistency across metrics and across definitions of failure (range of hits 23 to 27). Second, the highest hit rates were consistently associated with teacher evaluation scores as opposed to standardized measures of achievement. Thus, while it seemed that metrics were roughly equivalent in terms of predictive validity, minor differences in predictor strength could be attributed to differences in outcome variables.

Correlational Analyses

While correlations do not address the critical issue of accurate versus inaccurate predictions, they do provide considerable insight into

Table 22

Ecological Congruence Metric A Hit Rate For Teacher Recommendations

Teacher Code Number	Hits (% for teacher)	Misses (% for teacher)
01	7 (100%)	0 (0%)
02	4 (66.6%)	2 (33.3%)
03	1 (50%)	1 (50%)
04	1 (100%)	0 (0%)
06	1 (100%)	0 (0%)
07	3 (60%)	2 (40%)
08	8 (100%)	0 (0%)
10	2 (66.6%)	1 (33.3%)
11	2 (66.6%)	1 (33.3%)
12	2 (66.6%)	1 (33.3%)
Total	31	8
Percentage of Sample	79.5%	20.5%

NOTE: Failure was defined as a Teacher Recommendation score of $\leq$ 12. Ecological discordance was defined as a Metric A score of more than 60.

Table 23

Metric F and Metric M Hit Rates for Selected Achievement Criteria

Metric and Discordance Criteria	Definition of Failure	Hits (%)	Misses (%)
Metric F score greater than 55	Reading Comprehension grade equivalent less than 1.6	27 (71%)	11 (29%)
Metric F score $\geq$ 50	Teacher Total Evaluation score of less than 60	26 (67%)	13 (33%)
Metric M score $\geq$ 10	Teacher Recommendation score of less than 12	28 (72%)	11 (28%)
Metric M score $\geq$ 10	Reading Comprehension grade equivalent less than 1.6	23 (61%)	15 (39%)

NOTE: Refer to Table 18 for Metric definition.

relationships between variables. Indeed, predictive indices are most frequently validated with correlational analyses. Consequently, in hopes of identifying significant relationships, correlational analyses between a number of variables occurred.

Metric-Achievement Correlations

Of primary importance to ecological hypotheses, relationships between congruence metrics and Step 4 outcome or achievement variables were explored. That is to say, to what extent could movement of congruence metrics predict movement of student achievement variables. As Table 24 illustrates, while correlations were modest overall, metrics evidenced some predictive utility. Metric C, for example, demonstrated several significant relationships to student achievement (i.e., $r = -.38$, $p < .01$ with teacher language arts evaluation). As anticipated, relationships were inverted. As ecological congruence scores increased, student achievement scores decreased. Metric M also showed a pattern of relatively strong correlations. A number of significant inverse relationships to teacher evaluation scores emerged ($r = -.33$, $r = -.34$, $r = -.29$, $r = -.34$, $r = -.32$, $p < .05$).

Several congruence metrics correlated with various aspects of parental evaluations of student performance. The direction of correlations, however, was unexpected. On Metric C, to illustrate, as congruence between pupil and teacher increased, parents' estimations of their children's happiness and general social-emotional functioning at school decreased. That is to say, the less pupils and teachers fit, the

Table 24

Correlations Between Metrics and Achievement

	Metric B	Metric C	Metric F	Metric H	Metric J	Metric M
Math Raw Score	-.33*					
Teacher: Language Arts		-.38**				-.33*
Teacher: Math		-.34*				-.34*
Teacher: Emotional Development						-.29*
Teacher: Recommendations		-.27*				
Teacher: Total Academic		-.37*				-.34*
Teacher: Total Evaluation		-.32*		-.32*		-.32*
Parent: Student Happiness	.28*	.41**				
Parent: Social Competence					-.45**	
Parent: Math				.32*		
Parent: Total Soc-Emo.		.36*	-.31*		-.30*	.30*

* $p < .05$. ** $p < .01$. NOTE: Refer to Table 18 for Metric definition.

more parents reported their children to be happy, eager, and socially competent at school. It may be that the effect of pupil-teacher congruence on parents is different than its effect on students.

Metric-Achievement Correlations Without Certain Teachers

When calculating the predictive hit rate of several congruence metrics it was noted that various metrics were differentially predictively valid for different teachers. Perhaps strength and pattern of significant correlations between metrics and student achievement would be affected by deletion of certain teachers from data analyses? Teacher code number 08 stood out as an anomaly of sorts among the sample of teachers; not because she was less adequate, but because she was excessively adequate. She had the highest SAT class averages among the sample (reading comprehension grade equivalent 2.45). Semi-structured parent telephone interviews revealed overwhelming parental satisfaction with teacher code number 08. Also, she had low hit rates with some congruence metrics. It was reasoned that, perhaps, extremely tolerant and dedicated teachers are not inclined to be influenced in their treatment of children by ecological congruence as defined in this study.

Table 25 reports all significant correlations between ecological congruence metrics and measures of student achievement with teacher code number 08 deleted from analyses. Comparing the strength and pattern of Table 24 significant correlations (all teachers included in analyses) with Table 25 significant correlations (teacher code number 08 omitted

Table 25

Correlations Between Metrics and Achievement: Teacher 08 Deleted

	Metric B	Metric C	Metric F	Metric H	Metric J	Metric M
Math Raw Score	-.38*					
Teacher: Language Arts	-.33*					
Teacher: Behavior Comp.	-.34*				-.38*	
Teacher: Total Evaluation	-.43**			-.37*		-.36*
Parent: Student Happiness	.32*	.45**				
Parent: Social Comp.					-.41*	
Parent: Math				.34*	.32*	.37*
Parent: Total Soc-Emo		.40*	-.35*			.33*
Parent: Total Evaluation		.32*	-.36*			

* $p < .05$. ** $p < .01$. NOTE: Refer to Table 18 for Metric definition.

from analyses) revealed that one teacher may indeed influence the predictive validity of certain conceptualizations and calculations of ecological congruence. While relationships to standardized achievement test results were virtually unchanged, instances, though not magnitudes, of significant correlations between metrics and teacher evaluations of student achievement decreased noticeably with the deletion of teacher 08. Equally, magnitude as well as instances of significant correlations between metrics and parents evaluations of their children's school functioning increased slightly.

Teacher code number 11 also stood out as an anomaly of sorts among the sample of first grade teachers; this was her first year teaching grade one. Because prior to this study she had always taught kindergarten and also because predictive hit rates for her students demonstrated acute disparity across metrics, she was deleted in combination with teacher code number 08 from correlational analyses between student achievement and congruence metrics. Table 26 presents all significant correlations to emerge. A noticeably different pattern of relationships was now evident. Metrics B, H, and M now appeared to evidence the most frequent relationships to student achievement.

Since it was reasoned that student ability may influence the strength and pattern of relationships between metrics and student achievement, and because teacher 07 had a number of relatively low achieving students (as measured by the SAT), she was deleted from correlational analyses. As Table 27 illustrates, instances of

Table 26

Correlations Between Metrics and Achievement: Teachers 08 and 11 Deleted

	Metric B	Metric C	Metric F	Metric H	Metric J	Metric M
Reading Comprehen. Raw Score	-.48**			-.37*		
Teacher: Language Arts	-.35*					-.37*
Teacher: Math						-.38*
Teacher: Social Comp.	-.40*			-.32*		
Teacher: Emotional Development				-.45**		-.40*
Teacher: Behavior Comp.	-.51**			-.35*	-.34*	
Teacher: Total Academic						-.39*
Teacher: Total Evaluation	-.51**			-.46**		-.40*
Parent: Student Happiness		.43*				
Parent: Social Competence					-.39*	
Parent: Math				.35*	.33*	
Parent: Total Evaluation			-.34*			

* $p < .05$. ** $p < .01$. NOTE: Refer to Table 18 for Metric definition.

Table 27

Correlations Between Metrics and Achievement: Teacher 07 Deleted

	Metric B	Metric C	Metric F	Metric H	Metric J	Metric M
Reading Comprehen. Raw Score		-.31*				
Teacher: Language Arts		-.51**	.50**			-.29*
Teacher: Math		-.40*	.39*			-.29*
Teacher: Emotional Development						-.29*
Teacher: Behavior Comp.			.38*			
Teacher: Recommendation		-.39*	.36*			
Teacher: Total Academic		-.48**	.47**			-.29*
Teacher: Total SEB			.25*			
Teacher: Total Evaluation		-.45**	.44**	-.31*		
Parent: Student Happiness	.38*	.43**	-.30*	.34*		
Parent: Social Comp.					-.45**	
Parent: Math				.42*	.39*	
Parent: Total Soc-Emo		.31*				.35*

* p < .05.
** p < .01.

NOTE: Refer to Table 18 for Metric definition.

significant correlations with student achievement now shifted to Ecological Congruence Metrics C and F.

Metric-Achievement Correlations With Students Grouped

Because of obvious changes in patterns of significant correlations between congruence metrics and student achievement with teacher code number 07 deleted from analyses, the effect of student ability on metric predictive validity became a further direction of exploration. To examine the extent to which predictive utility of congruence metrics was related to student ability or achievement, the sample of students was divided into three ability or achievement groups. Based on SAT reading comprehension grade equivalents, students were placed in either a high (grade equivalent greater than 2.2), average (grade equivalent less than 1.6 but more than 2.2), or low (grade equivalent less than 1.6) achievement/ability group. The high group had seven subjects, the low group 15 subjects, and the average group 16 subjects. (Recall that SAT results were only available for 38 of the 39 students.) Correlational analyses for these groups comparing metrics and achievement evidenced among the strongest relationships to be found.

Table 28 presents all significant correlations between ecological congruence metrics and achievement for the 15 students who had SAT reading comprehension grade equivalents of less than 1.6. While sample size was small and thus the probability that relationships occurred by chance was in most cases high ($p < .05$), correlations were generally

Table 28

Correlations Between Ecological Congruence Metrics and Low Student Achievement

	Metric C	Metric F	Metric H	Metric J	Metric M
Math Raw Score					-.48*
Teacher: Emotional Development		-.45*			
Teacher: Behav. Comp.				-.56*	
Teacher: Total SEB					.48*
Parent: Student Happiness	.68**	-.59*			
Parent: Social Comp.	.50*				
Parent: Math			.48*		
Parent: Total Soc-Emo	.66*	-.56*			
Parent: Total Eval.		-.49*			

* p < .05.
** p < .01.

NOTE: Refer to Table 18 for Metric definition.

increased in strength over previous analyses. For example, Metric J scores correlated -.56, $p < .05$, with teacher evaluation of low achieving student behavioral compliance.

Table 29 presents all significant correlations between ecological congruence metrics and average student achievement (SAT reading comprehension grade equivalents of more than 1.6 and less than 2.2). Predictive strength for Metric J particularly increased for most teacher evaluation scores (i.e., the correlation with teacher evaluation of language arts achievement was .45 and with teacher evaluation of mathematic achievement was .52, $p < .05$). SAT subtests, however, were not significantly related to any congruence metrics for average students.

Table 30 presents all significant correlations between ecological congruence metrics and achievement for the seven students who had SAT reading comprehension grade equivalents of greater than 2.2. In general, correlations are very strong. For example, Metric C correlated -.88, $p < .05$, with teacher evaluations of high achieving students emotional development. Likewise, parental evaluation of high achieving students happiness at school was very strongly related to Metric J scores ($r = .86$, $p < .05$).

Metric - Student Variable Correlations

Since eight student variables were deleted from calculation of some Ecological Congruence Metrics but because Step 1 implicated their

Table 29

Correlations Between Ecological Congruence Metrics and Average Student Achievement

	Metric C	Metric F	Metric J	Metric M
Teacher: Language Arts			.45*	
Teacher: Math			.52*	-.51*
Teacher: Social Comp.	.44*			
Teacher: Emotion. Develop.			.45*	
Teacher: Recommendation			.43*	
Teacher: Total Academic			.52*	
Teacher: Total Evaluation			.46*	
Parent: Social Comp.			-.57*	
Parent: Read		.56*		
Parent: Math	.56*			
Parent: Total Academic		.50*	-.47*	
Parent: Total Evaluation		.51*		

* $p < .05$.

NOTE: Refer to Table 18 for Metric definition.

Table 30

Correlations Between Ecological Congruence Metrics and High Student Achievement

	Metric C	Metric J	Metric M
Teacher: Language Arts		.81*	-.68*
Teacher: Emotion. Development	-.88*		-.72*
Teacher: Recommendation		.69*	
Teacher: Total Academic		.75*	
Teacher: Total SEB	-.69*		-.68*
Teacher: Total Evaluation			
Parent: Student Happiness		.86*	
Parent: Read			.79*
Parent: Total Academic			.75*

* $p < .05$.

NOTE: Refer to Table 18 for Metric definition.

relevance in pupil-teacher fit, age, gender, and yes-no response items were correlated with congruence metrics and with achievement scores. Perhaps these student variables were related to student achievement and/or to ecological congruence?

Table 31 presents significant correlations between these eight student variables and measures of end of first grade student achievement. The student descriptor "Parent/s are professionals" evidenced no significant correlations to any measure of student achievement. Likewise, the student descriptor "On social assistance" was characterized by primarily insignificant relationships to student achievement. The remaining six student variables, however, demonstrated numerous mild to moderate significant correlations. The student descriptive variable, "English is a second language", to illustrate, showed many relatively strong correlations to student achievement. ESL student academic achievement and teacher recommendation scores showed a tendency to be lower than EFL student scores on the same measures. ESL correlated inversely with parents' evaluations of their children's happiness and general social emotional functioning ($r = -.49$, $p < .01$ and $r = -.33$, $p < .05$, respectively).

Table 32 presents significant correlations between the same eight student variables and metrics of ecological congruence. Because these student variables were omitted from calculative development of most metrics, and because relationships between these student variables and achievement were apparent, exploration of their relationship to metric

Table 31

Correlations Between Student Variables and Achievement

	ESL[a]	Single Parent[a]	Social Assist.[a]	Siblings[a]	Only Child[a]	Age[b]	Gender[c]
Read Comp. Raw Score	.35*	-.30*		.29*	-.34*		
Teacher: Language Arts	.35*	-.30*			-.37**		
Teacher: Math				.35*	-.30*		
Teacher: Social Comp.						-.49**	.28*
Teacher: Behav. Comp						-.40**	.31*
Teacher: Recommend.	.33*	-.29*			-.36*		
Teacher: Total SES							
Teacher: Total Eval.				.27*			
Parent: Student Happiness	-.49**					-.36*	
Parent: Social Comp.						-.30*	
Parent: Math			-.29*				
Parent: Total Soc-Emo	-.33*					-.41**	

* $p < .05$
** $p < .01$

[a] 1 = yes; 2 = no
[b] Age in months
[c] 1 = Male; 2 = Female

Table 32

Correlations Between Student Variables and Metrics

	ESL [a]	Single Parent [a]	On Social Assistance [a]	Younger Siblings [a]	Gender [b]
Metric B	-.44*				
Metric C	-.28*	.42**			
Metric F		-.40**			.29*
Metric J		-.31*	-.29*		.27*
Metric M				-.28*	

* $p < .05$
** $p < .01$

[a] 1 = yes, 2 = no
[b] 1 = male, 2 = female

NOTE: Refer to Table 18 for Metric definition.

scores seemed warranted. The student variables "Parent/s are professionals", "Only child", and "Age" demonstrated no significant relationships to congruence metric scores. The student items "On social assistance", "Younger siblings", and "Gender" showed modest and sparse relationships to various ecological congruence scores (i.e., $r = -.29$, $p < .05$ with Metric J, $r = -.28$, $p < .05$ with Metric M). Student descriptive variables "ESL" and "From a single parent family", however, evidenced much stronger and more frequent significant correlations with congruence metrics. "ESL" correlated $-.44$, $p < .01$ with Metric B and $-.28$, $p < .05$ with Metric C.

One-Way Analyses of Variance

Further exploration of the relationships between certain student variables and ecological congruence metrics seemed warranted. Consequently, a number of one-way analyses of variance were done. Since negative numbers cannot be accommodated by sum of squares, only Ecological Congruence Metrics B, C, F, H and J were included in analyses. It was found that group mean scores on each of these metrics were not significantly ($p < .05$) different between boys and girls, between children who were young, medium, and old, between children who were and those who were not on social assistance, and between children who had siblings and those who did not.

On Ecological Congruence Metric B, however, a significant difference in group means of ESL children and EFL children was found (F

= 7.95, df 37, p = .008). This seemed to add further support to the position that ESL children were less likely to establish congruence with their first grade teachers than EFL students. A significant difference in Metric B group means of children from single parent families and children from two parent families was also discovered (F = 8.79, df 37, p = .005). This seemed to confirm correlational results that suggested children from single parent families are more congruent with their first grade teachers than children from two parent families. Because we know so little about the nature and meaning of this finding, any comment would be highly speculative.

Summary of Results

Initially, 14 conceptualizations and calculations of ways to compare student profiles and teacher profiles were developed. Correlational analysis resulted in 7 such conceptualizations being deleted and 7 being retained as Ecological Congruence Metrics. It was found that these metrics could predict various outcomes with considerable (70 to 80%) accuracy, and that differences in predictive hit rates appeared related to both the metric employed (predictor variable) and the index of achievement used (criterion variable). Deletion of specific teachers from analyses altered patterns, incidence, and strength of metric-achievement correlations. Correlations between metrics and low student achievement, metrics and average student achievement, and metrics and high student achievement resulted in some very strong correlations, particularly in terms of teacher evaluations of achievement. To various degrees, certain background student variables were also found to relate to ecological congruence scores. Bearing in mind this study was highly exploratory, and that ecological instruments and congruence metrics' conceptualizations and calculations were unprecedented and preliminary, speculation regarding the meaning, interpretation, and relevance of these findings may serve to guide conclusions regarding the validity of ecological predictors of first grade achievement.

CHAPTER VIII

INTERPRETATION AND DISCUSSION OF RESULTS

At first glance, predictive hit rates of 70 to 80% and correlations as high as .81 may not appear to represent much improvement over conventional predictive studies. In terms of the uniqueness of the sample, however, such results may hold considerable promise for the improved predictive accuracy of kindergarten screening. In terms of categories of the prediction-performance matrix, the current sample was composed entirely of true positives and false positives. That is, all children in the sample were designated by their kindergarten teachers as at-risk of encountering difficulty in first grade. Some of these children did experience problems in first grade (true positives) and some did not (false positives). As Figure 2 on page 35 illustrated, true positives and false positives generally constitute approximately 20% of predictive investigation samples. Based on the original sample of 53 at-risk students and the pool of 218 kindergarten students from which they were drawn, as well as Step 4 student achievement results, Figure 3 represents a likely prediction-performance matrix distribution for subjects.

As opposed to predicting student achievement generally, the achievement of students who frequently elude predictive accuracy, primarily false positives, was predicted with some 80% accuracy. Of

	Inadequate Achievement	Adequate Achievement
At-Risk	17 True Positive	35 False Positive
Not At-Risk	23 False Negative	143 True Negative

Figure 3: Proposed Prediction-Performance Matrix Distribution for Subjects

equal concern, however, were false negatives, students who also elude accurate prediction. While discussion with first grade teachers revealed that not all first grade failures were identified by kindergarten teachers, in general only a handful of genuine false negatives seemed to exist. Given the pool of 218 students, one would except some 20 to 30 false negative at-risk designations. Since first grade teachers did not give the impression this many students were inadvertently excluded from the study, it seems reasonable to infer that the magnitude of false negatives in the current study was less than in traditional predictive studies. This seems logical since identification criteria (Step 2) were liberal. If most of these false negatives were contained in the at-risk sample, they would be true positives; a speculation consistent with the relative numbers of true positives and false positives in the sample.

Based on comparison of traditional kindergarten screening prediction-performance matrix distributions, the number of students in the kindergarten pool, the number of students designated at-risk, and achievement measures of the sample, it seems reasonable to conclude that by and large the attempt to focus only on those students who constitute the vast majority of predictive error was successful. The finding, for example, that Metric A scores could discriminante teacher recommendations with 80% accuracy must be interpreted relative to the likelihood that traditional predictive indices would have achieved only perhaps 50% accuracy given the sample.

Not only because of the uniqueness of the sample but also because of the preliminary nature of instruments and hypotheses, the results of this study seem particularly encouraging. Consider, for example, the extent of research effort behind the development and predictive validation of measures of student perceptual processes. In a thorough review of studies correlating perceptual-motor abilities with measures of achievement, Lesiak (1984) reported correlations as high as .40. Given the relatively modest amount of effort directed at the development and predictive validation of congruence metrics, it may be an ecological approach to predicting first grade student achievement holds at least as much promise as a traditional perceptual processes orientation.

When interpreting and evaluating the relevance and impact of current findings, primary research focus, the ecological prediction of first grade student achievement, was coupled with several peripheral research issues. Because this study differed from conventional predictive investigations in several ways, its results contribute to an appreciation of ecological prediction as well as provide insight into the value and utility of a number of research characteristics. Indeed, the current study differed from traditional predictive studies not only in terms of sample characteristics, but also with regard to a number research design dimensions; 1) the utilization of q-methodology, 2) incorporation of both conventional and unconventional educational risk factors, 3) the dissimilarity between predictor variables (Ecological Congruence Metrics scores) and outcome variables, 4) addressing the issue of criterion variable sensitivity by evaluating student achievement in several ways, and 5) basing all research design characteristics on the fundamental assumptions of ecological theory. In truth, the strength of preliminary results is likely attributable to a combination of these research characteristics. Interpretation of results, consequently, is intertwined with an appreciation of the exploratory nature of the study, both in terms of conceptual assumptions and research characteristics.

Appropriateness of Q-Methodology

As outlined in review of the literature, a number of traditional techniques (i.e., checklists, rating scales, direct observation) could have been employed to develop both teacher and student profiles. Instead, a q-sort procedure was utilized. With minimal transferring manipulation, translation, and inferences regarding the sorted student descriptor cards, strings of digits that represented teachers and students across a wide range of characteristics were developed. This limited amount of inference and manipulation perhaps contributed to the validity of teacher and student profiles. The strong correlations between Ecological Congruence Metrics scores and teacher evaluation scores of high achieving pupils seems to support the validity of subject profiles in as much as it is conceptually consistent with what would logically be expected. The profiles of high achieving students would be expected to strongly relate to teacher ranking of student characteristics that contribute to success and failure. Consequently, congruence metrics that quantified relationships between student and teacher profiles would be expected to correlate with teacher evaluation of student achievement.

Further evidence that q-methodology represented a valid technique for developing profiles, and therefore support for its selection as a predictive research instrument, comes with the consistent and obvious finding that congruence metrics were more sensitive to teacher-generated evaluations than to standardized achievement test results or parental judgement of children's at-school functioning. If teacher profiles truly measure teacher beliefs, attitudes, preferences and requirements, and if student profiles truly measure student characteristics and behaviors, comparison of these profiles would be expected to relate most strongly to teacher evaluation of students. This was consistently the case, both with predictive hit rates and with correlational analyses. However, it may be difficult to untangle the validity of q-sort profiling procedures from the validity of the student descriptors employed. The inclusion of unconventional educational risk factors, for example, may at least partially be responsible for the apparent validity of q-methodology.

Value of Unconventional Risk Factors

As will be recalled, both student and teacher profiles were based on 63 student descriptors. These descriptors contained many student attributes implicated in school performance, but generally not addressed in traditional kindergarten screening programs. Arguing for broader appreciation of student attributes that may have some indirect predictive utility, descriptors concerned with student ethnicity, SES, familial dynamics, gender, personality, and physical appearance were among the descriptors sorted and therefore contributory to profile development. Correlational analysis and analysis of variance provided strong support for the appropriateness and value of including these unconventional educational risk factors in predictive investigations generally, and ecological predictive investigations specifically.

Table 31 on page 152 presents significant correlations between student achievement and several unconventional risk factors (ESL, From a single parent family, On social assistance, Younger siblings, Only child). The student descriptor "ESL", for example, correlated with SAT reading comprehension raw scores ($r = .35$, $p < .05$), teacher language arts evaluations ($r = .35$, $p < .05$), and teacher recommendations for special needs placement, program modification, grade retention, and reading group designation ($r = .33$, $p < .05$). It seemed EFL students tend to out-perform ESL students on certain measures of achievement and that, therefore, such a descriptor was predictively appropriate. From an ecological prespective, this would be interpreted as a consequence of the tendency of EFL students to be more congruent with their first grade teachers than ESL students.

The student descriptor "From a single parent family", while inverse, also related to several measures of student achievement ($r = -.30$, $p < .05$, with SAT reading comprehension; $r = -.30$, $p < .05$, with teacher language arts evaluation; and $r = -.29$, $p < .05$, with teacher recommendations). Children in the at-risk population from single parent families tended to out-perform students from two parent families on certain measures of achievement. This was contrary to previously reviewed literature (Crow, 1978; Emery, 1982) which would lead one to believe that negative teacher expectancies for children from single parent families may result in depressed achievement scores. Because this literature focused on a normal population and the current study involved an at-risk population, it is not clear how this finding relates to previous research. It may well be that as single parent families become continually more common, and single parents become more sensitive and responsive to their children's needs, the direction of the relationship may indeed be changing. That is to say, it is not too difficult to imagine that single parents, as opposed to double parents, may spend more time with their children generally, and more time in school-related activities specifically. Regardless of explanation, this unconventional risk descriptor appeared appropriately placed among q-sort cards.

The two seemingly related student descriptors "Younger siblings" and "Only child" showed numerous significant correlations to SAT scores as well as teacher evaluative scores. Children without younger siblings showed a modest but significant tendency to out-perform children with younger brothers and sisters ($r = .29$ with SAT reading comprehension raw scores; $r = .35$ with teacher evaluation of mathematics competency; $r = .27$ with teacher total evaluation of student achievement, $p < .05$). It may be that some aspect of family dynamics negatively affects students with younger siblings. For example, mothers with several children may be too busy to devote adequate attention to all their children. Consistent with speculative inference, the student descriptor "Only child" showed numerous inverse relationships to achievement ($r = -.34$ with SAT reading comprehension; $r = -.37, -.30, -.36$ with teacher language arts and mathematics evaluations, and teacher recommendations). Again, significant correlations provide support for q-sort inclusion of these sorts of unconventional indices of school success and failure.

Significant correlations between student gender, a factor known to relate to school functioning but rarely addressed in conventional kindergarten screening, and certain measures of achievement also emerged. Bearing in mind the uniqueness of the sample, girls had a tendency to out-perform boys only in relation to teacher evaluations of student behavioral compliance ($r = .31, p < .05$) and social competence ($r = .28, p < .05$). Since no significant correlations between standardized tests of achievement and gender were found it may be that boys and girls are equally equipped to deal with first grade curriculum. It may be, however, that boys are less socially and behaviorally controlled than girls. How this social and behavioral immaturity impacts on ecological systems remains to be explored. In general, however, certain correlational results of this study suggest that unconventional educational risk factors such as student gender, familial dynamics, and ESL status were related to various measures of student in-school functioning for the sample used.

For reasons which can currently only be speculated, these sorts of unconventional educational risk factors also appeared to relate to Ecological Congruence Metrics. For example, student descriptive variables "ESL" and "From a single parent family" evidenced relatively strong and frequent significant correlations with congruence metrics. "ESL" correlated -.44, $p < .01$ with Metric B and -.28, $p < .05$ with Metric C. While this did not automatically indicate teachers disliked or were prejudiced against ESL students, it did suggest such students had a modest tendency to establish pupil-teacher congruence, as defined by metrics, less often and/or to a lesser extent than EFL students. Restated, the student attributes teachers preferred were less characteristic of ESL students than of EFL students. In the same vein, students from single parent families as opposed to students from two parent families demonstrated a stronger tendency toward ecological congruence (with Metric C $r = .42$, $p < .01$; with Metric F $r = -.40$, $p < .01$; with Metric J $r = -.31$, $p < .05$).

Analyses of variance, it will be recalled, supported these inferences. The group means of ESL and EFL students, and students from single versus two parent families on Ecological Congruence Metric B were significantly different from each other. Thus it seems that certain unconventional educational risk factors, factors generally ignored in traditional kindergarten screening, are related to student achievement and also implicated in the extent to which teachers and students fit or do not fit. While it is difficult to determine the degree to which inclusion of these unconventional factors contributed to the predictive hit rates and correlations that were found, it seems reasonable to conclude that a broader appreciation of predictively appropriate student attributes has some merit. Beyond the inclusion of unconventional educational risk factors in establishing teacher-student congruence, however, was a broad multi-dimensional approach to assessing student achievement. Particularly, would different outcome variables be differentially sensitive to ecological metrics?

Criterion Variable Differential Sensitivity

In reviewing the literature it was found that predictive investigations most generally employed standardized achievement test scores as criterion or outcome variables. It may be recalled, more realistic comprehensive indices of school performance were argued for. In line with that position, broad multi-source measures of student functioning were employed. Because results were based on seven parent-generated student performance scores, nine teacher-based evaluation scores and two standardized measures of achievement, a number of observations regarding the differential sensitivity of criterion variables are apparent. In terms of overall predictive hit rate, for example, teacher recommendations were most sensitive to congruence metrics. (Metric A had 79.5% accurate hits. Metric M had 72% accurate hits.) Teacher Total Evaluation scores were characterized by a few less hits. (Metric A had 69.2% accurate hits. Metric F had 67% accurate hits.) SAT Reading Comprehension grade equivalents had a few more predictive misses. (Metric A had 65.8% accurate hits. Metric F had 71% accurate hits.) In terms of hit rates, predictive accuracy fluctuated as much as 20% relative to outcome variables employed.

This was also very much the case with correlational findings. Metrics correlated differently with different outcome measures. For example, Metric J correlated with parental judgement of children's at-school social compliance ($r = -.45$, $p < .01$), while Metric B correlated with teacher evaluation of student language arts competency ($r = -.38$, $p < .01$). Granted such differential sensitivity may at least partially be the consequence of instrument and/or correlational characteristics, it may be that specific metrics, because of conceptual bases or arithmetic calculations, are better predictors of some outcomes than of others. What this means, of course, is when evaluating predictive investigations and kindergarten screening programs, the pivotal position of outcome variables must be acknowledged.

Since in first grade standardized achievement test results are relatively inconsequential, it makes little sense to focus on predicting standardized student achievement. Since teacher evaluations and recommendations for students are, reportedly, ultimately consequential in terms of decisions regarding special needs eligibility (Ysseldyke & Algozzine, 1982), for example, it seems more reasonable to search for valid predictors of teacher evaluations and recommendations. This was the case with the Ecological Congruence Metrics developed here. In fact, for many exploratory correlational analysis, no significant relationships between SAT scores and metrics were found while many significant relationships between teacher evaluation scores and metrics emerged. This leads one to conclude that not only are metrics good predictors of teacher evaluations, but also that SAT results and teacher evaluations are not identical.

Parent evaluation scores, while seemingly related to other sources of student evaluation (refer to Table 16 on page 125 and Table 17 on page 126), demonstrated unusual and unexpected relationships to metrics. In the vast majority of significant correlations between parental evaluation of student achievement and Ecological Congruence Metrics, relationships were in an unexpected direction. That is to say, in most cases, as ecological congruence between teacher and pupil decreased, parent evaluations of childrens' achievement increased.

Take, for example, Metric J which evidenced numerous significant correlations to teacher evaluation scores for average (SAT grade equivalents 1.7 - 2.2) reading ability students (refer to Table 29 on page 149). As congruence between average (SAT Reading Comprehension grade equivalents 1.7 - 2.2) pupils and their first grade teachers increased, so too did teacher evaluation scores ($r = .45, .52, .45, .43, .52, .46$, $p < .05$). Curiously, as congruence between average pupils and their first grade teachers increased, parents' evaluations of their average children's at-school social competence ($r = -.57$, $p < .05$) and overall academic functioning ($r = -.47$, $p < .05$) decreased. While this could be attributed to instrument and correlational characteristics, in truth, a number of alternate explanations are possible. It could be that parents, having ulterior motives, misrepresented their children's achievement during telephone interviews. Equally, it could be that parents based their judgements on very different input than did classroom teachers. However, because parents are gaining status in the educational decision making process and because their impact is becoming well-documented (Henderson, 1987), the curious relationships between parental judgements of achievement and congruence metrics require further exploration and analysis. It may well be that parents interpret pupil-teacher congruence/discordance quite differently than would be expected.

It seems, then, that the type or source of criterion variable appeared critically related to the significance of results, and also to interpretation of those results. In terms of predictive research generally, some clarification or at least examination of outcome variables seems necessary. The results of this study indicate the differential sensitivity of outcome variables to alternate ecological metrics. One reason for the common use of narrow definitions of achievement in traditional predictive studies may be that with predictor-criterion similarity, predictive accuracy is maximized. In terms of the ecological prediction of first grade achievement, however, predictor variables and criterion variables were very different from each other in content and form.

Predictor-Criterion Dissimilarity

As may be recalled, the MRT (Nurss & McGauvran, 1976) is reportedly the most widely used kindergarten screening test. Its predictive validity is considered so superior that it is frequently employed as a standard against which alternate screening measures are validated (Chew & Morris, 1984). In reviewing the research literature, however, criticism was leveled against the MRT because highly significant correlations ($r = .65$ to $.78$) could be attributed to similarity between predictor (MRT scores) and criterion variables (MAT scores). In terms of appreciating, interpreting and evaluating results of the ecological predictive study, this seems a relevant consideration.

Relative to MRT validation studies, contrast characteristics of the present ecological investigation. While, in truth, characteristics of MRT validation studies are representative of kindergarten screening test validation research generally, MRT validation research is focused on only for purposes of contrast and comparison. The MRT and the MAT are identical in format and very similar in content. Not surprisingly, they are strongly correlated. Ecological congruence metrics scores (predictor variables) were based on comparison of strings of numbers that represented teachers with strings of numbers that represented students. Consider, if you will, how different in format and content those scores are from the outcomes variables they predicted, SAT scores, teacher ratings and parental judgements.

The implication is not that attempts should be made to homogenize congruence metrics and indices of student achievement. Quite the contrary. It may be that in quest of predictive validity, criterion-predictor similarity has resulted in misleadingly strong correlation coefficients. That is to say, if prediction of MAT results is truly required, the MRT may be the best predictor currently available. If more practical student functioning is required, predictive value of the MRT may decrease considerably.

In search of predictive validity, in fact, the tendency of similar predictor-criterion variables to be associated with the strongest correlations may jeopardize research in the field generally. Given the results of this study, criterion-predictor similarity may not only be unnecessary and misleading, it may never result in increased predictive accuracy. That is, since so many complex interactional factors influence the strength of relationships between measures obtained during kindergarten (predictors) and measures obtained during first grade (criteria), predictive accuracy may best be served by addressing these interactional factors, rather than by homogenizing predictor and criterion.

At the very root of decisions regarding the nature of predictor and criterion variables, as well as all research design characteristics, are the fundamental assumptions upon which research questions are based. Consequently, in interpreting and discussing the results of this study, the relative merit and utility of ecological theory are more generally interpreted and evaluated.

Evaluating Ecological Theory

A child-deficit orientation to first grade failure was criticized as incompatible with the dynamic nature of school and learning. While traditional kindergarten screening indices such as the MRT focus exclusively on within-student characteristics, it seems somewhat unrealistic to attribute student failure only to cognitive and readiness deficiencies, particularly with regard to relatively mild forms of dysfunction. Attempting to conceptualize, quantify and predictively validate the construct of student ecological congruence actually represents an attempt to characterize more appropriately the nature of student achievement. The existence of variations in student attributes and behaviors was not disputed. In this study disagreement was directed at the assumption that these student variations are the basis for accurately predicting student achievement. The results of this study appear to provide support for that disagreement.

Schmidt and Perino (1985), as a contrasting example, using a weighted combination of measures of visual-perceptual and linguistic development, were able to predict subsequent special education placement with 77% accuracy, and high achieving pupils with 73% accuracy. Given the nature of predictor variables, their assumption appeared to be that deficient visual-perceptual and linguistic development was largely responsible for special education placement and, conversely, that superior visual-perceptual and linguistic performance was largely responsible for the above average achievement of some pupils.

I reasoned, on the other hand, that pupil-teacher compatibility or ecological congruence was largely responsible for teacher recommendations and equally responsible for the above average achievement of some pupils. Ecological Congruence Metric A accurately predicted which students would have less than average teacher recommendation scores and which would not, with 79.5% accuracy and Ecological Congruence Metric J was strongly correlated with teacher evaluations of high achieving students' language arts competencies ($r = .81$, $p < .05$). In evaluating the relative merits of contrasting theoretical orientations, the strength of relationships between predictor and criteria may speak for themselves.

Freebody and Rust (1985), to further contrast and illustrate, found correlations of .35 to .59 (median correlation .48) between the Concepts About Print (CAP) test administered at the beginning of grade one and six criterion measures (four of reading comprehension and two of word knowledge) administered at the end of first grade. The similarity between predictor and criteria, as well as the comparatively brief time lapse between predictor and criteria administration, should be noted. The researchers' assumption appeared to be that child competencies implicated in CAP scores were largely equivalent to child competencies implicated in reading comprehension and word knowledge.

Ecological assumptions, on the other hand, suggest that child competencies implicated in pupil-teacher congruence are largely equivalent to child competencies implicated in reading achievement, and that these child competencies fluctuate in response to teacher variations. Metric F predicted SAT reading comprehension with 71% accuracy. With teacher code number 07 deleted from analysis, Metric C showed correlations roughly equivalent in strength to those found by Freebody and Rust (1985; $r = -.31$, $p < .05$, with SAT reading comprehension; $r = -.51$, $p < .01$, with teacher language arts evaluations). The dissimilarity between predictor and criteria, as well as the comparatively longer time lapse between predictor and criteria administration, should be noted. Once again, the results of this study provide some support for the predictive appropriateness of ecological theory.

Summary: The Best Ecological Predictors of First Grade Student Achievement

Based on findings presented here, absolute statements regarding the best ecological predictors of first grade student achievement must be prefaced by some notion of the relativity of results. In fact, there was some support for the position that validity of predictive metrics developed here was contingent upon a number of interactional factors. Three generalizations regarding the nature of congruence quantification seem prerequisite to an appreciation of the best ecological predictive metrics:

1) Predictive validity of ecological congruence metrics appeared differentially related to outcome criteria. That is to say, different metrics may be required for the prediction of different achievement measures. It is conceivable, for example, that one congruence metric may be the best predictor of teacher recommendations, while another may be the best predictor of standardized achievement.

2) Predictive validity of ecological congruence metrics appeared differentially, and not necessarily in obvious ways, related to teacher differences. That is to say, different metrics may be more or less predictively valid for different types of teachers. It is conceivable, for example, that a beginning teacher may require a certain metric, a tolerant teacher a different metric, and a male teacher still a different metric to achieve unanimous predictive accuracy.

3) Predictive validity of ecological congruence metrics appeared differentially, and not necessarily in obvious ways, related to student differences. That is to say, different metrics may be more or less predictively valid for different types of students. It is conceivable, for example, that children of varying ability levels may require varying metrics to maximize predictive hit rate.

Given these three congruence quantification generalizations, it is easy to understand why educational research and technology have conspicuously avoided predictive implementation of ecological principles. Be that as it may and bearing in mind criterion-teacher-pupil interactions related to congruence metric predictive validity, some general conclusions regarding the best ecological presymptomatic identifiers of first grade failure are possible.

1) Ecological Congruence Metric A predicted teacher recommendations with considerable accuracy (hit rate of 79.5%). From this we could infer that Metric A conceptualizations and calculations were overall the most predictively useful among metrics.

2) Ecological Congruence Metric C predicted teacher recommendations with considerable accuracy (hit rate 77%). From this we could also conclude that Metric C conceptualizations and calculations on reduced and invert student items were the second most overall predictively useful of the metrics.

3) Ecological Congruence Metrics C and M demonstrated the strongest overall (across teachers) relationships to teacher evaluation of student language arts achievement. If the goal was to establish a metric universally appropriate across teachers for the prediction of teacher language arts evaluations, Metrics C and M conceptualizations and calculations may hold some promise.

4) Ecological Congruence Metric M evidenced the strongest and most frequent correlations with various aspects of teacher subjective evaluations. If the goal was to establish one metric universally appropriate across teachers for the prediction of overall teacher evaluations of students, Metric M may hold some conceptual and calculative potential.

5) Ecological Congruence Metric J showed the strongest and most frequent correlations between average student achievement and various aspects of teacher subjective evaluations. If the goal was to establish a metric specifically appropriate for average

ability/potential students, Metric J may represent an initial conceptual and calculative premise.

6) Ecological Congruence Metric C demonstrated extremely strong relationships to teacher evaluations of high achieving students social, emotional, and behavioral functioning. Since even these students were defined at-risk by their kindergarten teachers, Metric C may be useful for the prediction of at-risk, high-achieving students' social, emotional, and behavioral competencies.

While the above list is not exhaustive, it does represent a comprehensive appreciation of certain generalized results of this ecological predictive study. As with most research studies, obtaining significant enduring results is frequently the consequence of extensive limitations in terms of many aspects of research design. An examination of study limitations as well as speculation regarding practical, research and theoretical implications may serve to clarify and position the ecological results of this study in the larger stream of educational research.

CHAPTER IX

LIMITATIONS AND IMPLICATIONS

This study, perhaps because unprecedented, exploratory and preliminary, attempted only to improve the accuracy with which the first grade achievement of "marginal" kindergarten students can be predicted. Thus, because the sample employed here was very specific, generalization of findings to other groups remains to be validated. It should be noted, however, that "marginal" kindergarten students were selected specifically because it was believed they constituted the vast majority of predictive errors of over and underidentification, and also because profiling was sufficiently involved to warrant restriction of sample size.

Unfortunately, constriction of sample characteristics resulted in, ironically, problems with ecological or external validity. At this time, for example, nothing can be said regarding the predictive accuracy or appropriateness of ecological congruence metrics for kindergarten students who were retained in kindergarten or who were recommended for special needs placement. Likewise, the predictive validity of congruence metrics for children perceived by their kindergarten teachers as almost certain to realize satisfactory first grade achievement was not addressed. It seems likely that interactional assumptions upon which ecological prediction were based are equally applicable to low functioning as well as adequately functioning kindergarten students. To restate underlying research design logic, however, it was reasoned that increased predictive accuracy for this marginal group of students would constitute the most immediate and consequential application of improved early identification practices.

Because screening most typically and rampantly occurs in kindergarten classes, the focus of this study was exclusively on kindergarten populations. However, it is possible that ecological metrics have predictive value in other grades and for other populations. The relationship between, for example, pupil-teacher congruence and older students' achievement was outside the boundaries of this study. Equally, the relationships between gifted students and their teachers, and handicapped students and their mainstreamed or special education teachers, could not be investigated within the confines of the current study.

While adopting ecological assumptions and orientations, the realities of research design could not accommodate a pure ecological paradigm. It is clear that a host of classroom characteristics, and not merely the classroom teacher, interacts with a multitude of student characteristics to result in harmonious or unharmonious student functioning. In an attempt to empirically validate the predictive appropriateness of ecological conceptualizations, many restrictions in terms of both environmental and student characteristics necessarily occurred. For example, the predictive utility of congruence metrics that involved classroom characteristics such as pupil-teacher ratio, reading program, peers, physical arrangements and discipline methods was not addressed.

In the same sense, while a broad multi-source and multi-dimensional set of criterion variables were used to index end of first grade student achievement, some restriction was necessary due to limitations of time and resources. While this study was unable to establish the existence or non-existence of relationships between congruence metrics and other aspects of student functioning, such may represent important determinations. For example, it would be interesting to explore ecological congruence metrics' predictive association to student personality development, delinquency, truancy, self-concept, and school-community involvement. While this study in no respect contributed to an appreciation of the relationships between pupil-teacher congruence and these sorts of criteria, it is possible that such outcomes may be among the most sensitive measures of ecological congruence.

The current study, also, was limited to predictive analyses of pupil-teacher congruence. It may be, however, that the compatibility or fit between children and other significant figures in their ecosystems is critical to development, achievement, and satisfactory personal functioning. It may be, for example, that an index or metric of parent-child congruence could have predictive utility for certain negative outcomes such as child abuse. Since it seems that abusive parents do not uniformly abuse each of their children, and since some research has concluded that specific temperament characteristics render certain children vulnerable to parental abuse (Lewis & Rosenblum, 1981), a broader predictive application of ecological principles may provide insight into abusive parent-child relationships.

Finally, the current study was of necessity excessively simplistic in its approach to conceptualizing pupil-teacher congruence. Given the present state of research technology coupled with conventional notions of "proof", the study was forced to present a simple linear model of student descriptor-teacher preference interaction. In truth it is much more likely that variables are of varying importance to different teachers, and groups of variables interact with one another to produce congruence or discordance. To illustrate with a simple example, a teacher may react tolerantly toward descriptors in isolation (i.e., 5 1/2 years old, dirty and unkempt, male), but intolerantly toward a child with a combination of characteristics (i.e., a dirty, very young boy). Given limitations in research design, and limitations in the technology necessary to deal with complex interactional possibilities, the present study was restricted by a somewhat naive and simplistic approach to pupil-teacher fit.

Implications for Practice

The most obvious and immediate practical application of the results found here would be improved prediction of first grade student achievement. Ecological Congruence Metric A, for example, was shown to predict first grade teacher recommendations for marginal kindergarten students with almost 80% accuracy. Implementation of a screening program that utilized Metric A would likely represent at least some predictive improvement over traditional screening practices. Similarly, application of the congruence metrics developed here to specific groups (i.e., high achieving students) for specific criteria (i.e., teacher evaluation of language arts achievement) may ultimately lead to programming and intervention alternatives. Predictive studies, of course, are not merely concerned with predicting student achievement. Predictive research generally, as well as the current investigation, are concerned with increasing children's chances of success in school. By reducing errors of over and underidentification, the probability of school failure and dysfunction is actually reduced.

In the most far-reaching sense, ecological conceptualizations and congruence metrics developed and initially validated within this study have certain implications for education generally, and special education particularly. It is conceivable that teacher training and teacher in-servicing could some day be directed toward heightening awareness and sensitivity to the critical role of pupil-teacher congruence in satisfactory student achievement and functioning. Likewise, schools of the future may form class lists, not on current archaic criteria of equivalent numbers of boys and girls and ability heterogeneity, but rather on the compatibility or fit between pupils and teachers.

Such matching of pupils and teachers, it could be argued, would result in certain very tolerant teachers receiving the most difficult and most generally incompatible students. That is to say, some children would not be readily nor easily congruent with many teachers. In hopes of minimizing negative pupil-teacher interactions and counter productive teacher evaluations, such students may, under the proposed preventive system, be placed with teachers who evidenced the least discordance with them. Such teachers, no doubt, would be extremely tolerant, patient, flexible, open-minded, committed and dedicated. Their classrooms, consequently, would likely become "the new special education rooms".

Such an alternative, however, may not be totally without merit, particularly if it served to generally increase the overall harmony of the educational system, and more particularly if it served to specifically increase individual harmony between students and their classroom ecosystems. It may be, in fact, that this very tolerant, flexible, and dedicated group of teachers would be the most qualified and logical to become "the new special education teachers". Recognizing that such should and was occurring, additional resources and support (i.e., lower pupil-teacher ratio) would be directed toward these "new special education classrooms".

Implications for Future Research

Future research may serve to improve and refine the ecological congruence metrics developed here. It was found, for example, that the best predictive metrics always included SES, ethnic, familial dynamics, age, and gender student items. However, as will be recalled, because these items were not on an interval scale and therefore not legitimately subject to many forms of data analyses, they were not included in most metric calculations. It seems that descriptors concerned with a number of unconventional student characteristics may be related to pupil-teacher congruence. In fact, descriptors "ESL" and "From a single parent family" were shown to contribute to ecological discordance and congruence. Consequently, an improved q-sort procedure that could accommodate these sorts of student descriptors on an interval scale remains to be devised and validated.

In the same sense, an issue that all metrics addressed was the meaning or impact of teacher item ranking "Does not contribute to student success or failure". That is to say, teachers varied considerably with regard to their perceptions of the educational irrelevance of certain student descriptors. Some teachers ranked many descriptors as not contributing to student achievement, while others ranked very few as irrelevant. In conceptualizing and calculating ecological congruence, it was necessary to interpret these rankings. In retrospect, providing teachers with a ranking option of "Does not contribute to student success or failure" may have inadvertently provided an unrealistic, difficult to interpret, or even inappropriate ranking alternative. Thus, a q-sort procedure that does not provide such a ranking option may increase predictive accuracy of the ecological assumptions implemented here.

As well, some improvement and further refinement of the actual list of student descriptors may be warranted. While it was reasoned that the list was adequate based on review of the literature and Step 1 first grade teacher input, further examination and analysis may provide an improved list of student items and, consequently, improved predictive validity. For example, since certain familial descriptors appeared so critically implicated in pupil-teacher congruence, increased and more detailed descriptors of this sort may serve to improve predictive strength of congruence metrics developed here, as well as serve to more accurately represent the variables implicated in pupil-teacher compatibility. Thus, subsequent research could focus on further validation of current descriptors, as well as exploration and analysis of alternate descriptive student items.

As alluded to in "Implications for Research", expanded criterion or outcome variables seems an important direction for future research in ecological prediction. The measures of student achievement employed here were selected partly because they are commonly accepted (standardized tests, teacher evaluations) and also because they represent current novel conceptualizations of appropriate evaluative criteria (parental perceptions). In truth, however, many other important and consequential definitions and measures of student functioning may be associated with ecological congruence generally, and pupil-teacher congruence specifically. Therefore, an important implication for future ecologically oriented research would be the exploration, analysis, and validation of any of a number of broader definitions of student functioning in the classroom, at school, at home, or in the larger community and society.

Perhaps the potentially most consequential implications for future research revolve around more general application of predictive ecological assumptions and conclusions maintained and validated here. In terms of educational programming as well as apprehension of all critical interactive educational variables, an essential though exploratory direction for future research may involve analyses of pupil-teacher congruence for other special education categories. For example, exploration of student and teacher characteristics prerequisite to ecological congruence for gifted students, the physically handicapped, and the behaviorally disordered could conceivably serve to improve intervention alternatives for these groups of exceptional children.

Implications for Theory

Each and every special education endeavor is based upon, however indirectly, a conceptual paradigm or theoretical model regarding the nature of learning and children, the mechanics and etiology of failure and dysfunction, appropriate targets and strategies of intervention and remediation, and possible avenues of prediction and subsequent prevention. Consequently, while extremely removed from the classroom and from daily interaction with students, advancement, development, validation, and implementation of the best, most appropriate, most meaningful, and most correct conceptual models, is ultimately the greatest service that can be provided to children generally, and to exceptional children particularly. To grossly oversimplify the progression and contribution of conceptual paradigms to special education, it seems three distinct movements or waves have historically characterized the serious treatment of exceptional children; a child-deficit model, the behavioral paradigm, and an ecological orientation.

The analogy of educational paradigms as ocean waves seems particularly appropriate for as the force of one wave is overwhelming, a second wave is gaining momentum, while a third wave may be little more than a ripple on the distant ocean surface. The first wave of special education, the dominant current conceptualization and a paradigm that has served to distinctly advance the treatment and education of exceptional children, may be referred to as a child-deficit model. The second wave of special education was the behavioral paradigm which provided a much needed technology and has no doubt normalized the functioning of more children than any other single educational advancement.

Paradigms in education, fortunately, are not necessarily mutually exclusive. Rather, each conceptualization answers important questions and addresses certain issues. For extreme child dysfunction, for example, such as severe mental retardation, a child-deficit model may be especially appropriate. For the immediate reinstatement of behavioral comformity, absolutely critical for certain children in certain contexts, it is difficult to dispute the utility of behavioral technology. However, for many children, particularly those characterized by mild symptoms, neither a child-deficit nor a behavioral paradigm may be most appropriate.

As yet, perhaps, a ripple on the distant ocean surface, an ecological orientation, a model that addresses the critical interaction between children and their environments, may grow in force and momentum as its principles and assumptions are explored, analyzed, and validated. Although many significant results emerged from the current study, its greatest contribution may be less with details of significance than with attempts to advance and implement a radical paradigm for special education.

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APPENDIX A

STEP 1 LIST OF STUDENT DESCRIPTORS

Linguistic Competence

- communicates using well formed, complete sentences
- recalls details from a story
- follows directions involving words like under, over, in, out, near, far, left, right
- reproduces a spoken sentence consisting of five familiar words.
- rarely initiates conversation
- difficulty understanding instructions
- difficulty remembering instructions
- inarticulate speech
- verbally articulate

Perceptual and Motor Processes

- recognizes minimal differences in spoken words: cap - cup
- recognizes minimal differences in written words: hit - hat
- does not stay on line when printing
- letters frequently reversed: u - n
- copies shapes incorrectly
- frequently reverses words when printing: was - saw
- very neat printing
- clumsy and awkward in physical education
- jumps, skips and hops well

Behavioral Competence

- able to begin and complete classroom tasks
- very inattentive to classroom proceedings
- works well without adult supervision
- rarely completes assignments on time
- disorganized
- good workhabits
- disruptive in class
- cooperative
- disturbs others while they are working

Academic Readiness

- names basic colors
- associates letters with their most frequent sounds
- associates printed words with objects
- prints first name
- counts from 1 to 10

Academic Readiness (Continued)

- frequently confuses basic colors
- does not know any alphabet sounds
- does not enjoy books
- cannot hold pencil properly

Student Ethnicity

- English is second language
- kindergarten completed on native Indian reserve
- third generation Canadian
- recently immigrated to Canada from Italy
- Eskimo
- native Canadian Indian
- Anglo-Saxon origin
- caucasian
- Chinese parents

Student SES

- father is a medical doctor
- on social assistance
- rarely has adequate lunches
- never has adequate school supplies
- dirty, unkempt hair
- very clean and well dressed
- has appropriate winter clothing
- mother is a teacher
- very poor personal hygiene

Familial Structure and Interaction

- from single parent family
- father works out-of-town
- parents are in the process of divorce
- parents are currently undergoing marriage counselling
- father supports family while mother stays at home
- only child
- four younger siblings
- parents attend parent-teacher interviews together
- parents seemed interested and concerned about child's progress in school

Student Gender

- male
- female

Student Personality

- child overreacts (becomes very upset) in a stressful situation
- has a negative attitude toward self
- has a positive attitude toward school and learning
- extroverted, outgoing
- calm
- confident
- emotionally stable
- takes a long time to become comfortable in new situation
- bashful when meeting new children
- has difficulty sitting still, may wriggle a lot or get out of seat

Student Age

- 5 1/2 years old when beginning first grade
- 6.0 years old when beginning first grade
- 6 1/2 years old when beginning first grade

Physical Characteristics

- physically small for age
- physically large for age
- thin and pale with skin rashes
- very attractive
- very unattractive
- very strong and healthy
- frequently has colds
- never has colds

APPENDIX B

STEP 1 TEACHER DATA AND RESPONSE RECORD FORM

TEACHER NUMBER: ____________________

YEARS OF TEACHER TRAINING: ____________________

YEARS OF TEACHING EXPERIENCE: ____________________

YEARS OF GRADE ONE TEACHING EXPERIENCE: ____________________

AGE: __________ SEX: ______________

RESPONSE RANKINGS

ABSC	STSC	MDSC	MLSC	IRRE	MLFL	MDFL	STFL	ABFL

APPENDIX C

STEP 1 FREQUENCY OF TEACHER RANKINGS OF DESCRIPTORS

Descriptor	Ranking*	Frequency	Percentage
Has appropriate winter clothing	1	1	4.8
	2	2	9.5
	3	2	9.5
	4	5	23.8
	5	9	42.9
	6	2	9.5
Very clean and well dressed	2	1	4.8
	3	4	19.0
	4	10	47.6
	5	6	28.6
Dirty unkempt hair	5	11	52.4
	6	5	23.8
	7	4	19.0
	8	1	4.8
Never has adequate school supplies	5	6	28.6
	6	9	42.9
	7	6	28.6
Rarely has adequate lunches	5	1	4.8
	6	6	28.6
	7	3	14.3
	8	9	42.9
	9	2	9.5
Father is a medical doctor	1	1	4.8
	2	2	9.5
	3	6	28.6
	4	5	23.8
	5	7	33.3
Very poor personal hygiene	2	1	4.8
	5	6	28.6
	6	7	33.3
	7	7	33.3
Mother is a teacher	1	1	4.8
	2	3	14.3
	3	7	33.3
	4	6	28.6
	5	4	19.0

Descriptor	Ranking*	Frequency	Percentage
On social assistance	5	12	57.1
	6	1	4.8
	7	7	33.3
	8	1	4.8
Female	3	3	14.3
	4	4	19.0
	5	14	66.7
Male	3	1	4.8
	4	1	4.8
	5	15	71.4
	6	3	14.3
	7	1	4.8
Physically small for age	5	14	66.7
	6	7	33.3
Physically large for age	3	1	4.8
	4	2	9.5
	5	16	76.2
	6	2	9.5
Never has colds	2	2	9.5
	3	1	4.8
	4	13	61.9
	5	5	23.8
Frequently has colds	5	5	23.8
	6	9	42.9
	7	5	23.8
	9	2	9.5
Very strong and healthy	1	3	14.3
	2	5	23.8
	3	7	33.3
	4	6	28.6
Very unattractive	5	15	71.4
	6	4	19.0
	7	2	9.5
Very attractive	3	2	9.5
	4	3	14.3
	5	16	76.2

Descriptor	Ranking*	Frequency	Percentage
Thin and pale with skin rashes	5	5	23.8
	6	9	42.9
	7	3	14.3
	8	3	14.3
	9	1	4.8
5 1/2 years old when beginning first grade	3	1	4.8
	5	3	14.3
	6	6	28.6
	7	4	19.0
	8	6	28.6
	9	1	4.8
6.0 years old when beginning first grade	1	1	4.8
	2	8	38.1
	3	5	23.8
	4	5	23.8
	5	1	4.8
	7	1	4.8
6 1/2 years old when beginning first grade	1	2	9.5
	2	9	42.9
	3	4	19.0
	4	4	19.0
	5	2	9.5
English is a second language	5	2	9.5
	6	6	28.6
	7	8	38.1
	8	2	9.5
	9	3	14.3
Kindergarten completed on native Indian reserve	4	1	4.8
	5	16	76.2
	7	2	9.5
	8	2	9.5
Third generation Canadian	2	1	4.8
	3	1	4.8
	4	5	23.8
	5	14	66.7
Recently immigrated to Canada from Italy	5	9	42.9
	6	3	14.3
	7	6	28.6
	8	1	4.8
	9	2	9.5

Descriptor	Ranking*	Frequency	Percentage
Eskimo	5	18	85.7
	6	3	14.3
Native Canadian Indian	5	10	47.6
	6	6	28.6
	7	4	19.0
	8	1	4.8
Anglo-Saxon origin	2	1	4.8
	3	2	9.5
	4	3	14.3
	5	15	71.4
Caucasian	3	2	9.5
	4	3	14.3
	5	16	76.2
Chinese parents	2	2	9.5
	3	3	14.3
	4	5	23.8
	5	9	42.9
	6	1	4.8
	7	1	4.8
Parents seem interested and concerned about child's progress in school	1	7	33.3
	2	11	52.4
	3	3	14.3
Father supports family while mother stays at home	2	1	4.8
	3	5	23.8
	4	3	14.3
	5	12	57.1
Only child	2	1	4.8
	3	3	14.3
	4	5	23.8
	5	9	42.9
	6	3	14.3
Four younger siblings	2	1	4.8
	3	3	14.3
	4	5	23.8
	5	10	47.6
	7	2	9.5

Descriptor	Ranking*	Frequency	Percentage
Parents attend parent-teacher interviews together	1	2	9.5
	2	10	47.6
	3	4	19.0
	4	2	9.5
	5	3	14.3
Parents are currently undergoing marriage counselling	2	1	4.8
	4	2	9.5
	5	4	19.0
	6	4	19.0
	7	5	23.8
	8	4	19.0
	9	1	4.8
Parents are in the process of divorce	6	5	23.8
	7	5	23.8
	8	7	33.3
	9	4	19.0
Father works out-of-town	5	9	42.9
	6	9	42.9
	7	3	14.3
From single parent family	5	8	38.1
	6	5	23.8
	7	8	38.1
Child overreacts (becomes very upset) in a stressful situation	5	1	4.8
	6	6	28.6
	7	7	33.3
	8	6	28.6
	9	1	4.8
Extroverted, outgoing	2	4	19.0
	3	9	42.9
	4	5	23.8
	5	3	14.3
Calm	1	1	4.8
	2	2	9.5
	3	7	33.3
	4	9	42.9
	5	2	9.5
Confident	1	5	23.8
	2	12	57.1
	3	3	14.3
	4	1	4.8

Descriptor	Ranking*	Frequency	Percentage
Emotionally stable	1	8	38.1
	2	7	33.3
	3	5	23.8
	4	1	4.8
Takes a long time to become comfortable in new situation	5	2	9.5
	6	10	47.6
	7	7	33.3
	8	2	9.5
Shy	4	1	4.8
	5	8	38.1
	6	8	38.1
	7	4	19.0
Has difficulty sitting still, may wriggle a lot or get out of seat	4	1	4.8
	5	1	4.8
	6	5	23.8
	7	8	38.1
	8	4	19.0
	9	2	9.5
Verbally articulate	1	3	14.3
	2	10	47.6
	3	6	28.6
	4	1	4.8
	8	1	4.8
Inarticulate speech	4	1	4.8
	5	1	4.8
	6	4	19.0
	7	10	47.6
	8	4	19.0
	9	1	4.8
Difficulty remembering instructions	6	2	9.5
	7	6	28.6
	8	10	47.6
	9	3	14.3
Difficulty understanding instructions	6	1	4.8
	7	8	38.1
	8	9	42.9
	9	3	14.3
Rarely initiates conversation	5	4	19.0
	6	8	38.1
	7	6	28.6
	8	3	14.3

Descriptor	Ranking*	Frequency	Percentage
Reproduces a spoken sentence consisting of five familiar words	1	1	4.8
	2	6	28.6
	3	7	33.3
	4	6	28.6
	5	1	4.8
Follows directions involving words like under, over, in, out, near, far, left, right	1	3	14.3
	2	7	33.3
	3	6	28.6
	4	4	19.0
	5	1	4.8
Recalls details from a story	1	1	4.8
	2	15	71.4
	3	4	19.0
	4	1	4.8
Communicates using well formed, complete sentences	1	4	19.0
	2	15	71.4
	3	2	9.5
Jumps, skips and hops well	3	5	23.8
	4	14	66.7
	5	2	9.5
Clumsy and awkward in physical education	4	1	4.8
	5	4	19.0
	6	12	57.1
	7	4	19.0
Very neat printing	2	2	9.5
	3	7	33.3
	4	9	42.9
	5	3	14.3
Frequently reverses words when printing: was - saw	4	2	9.5
	5	3	14.3
	6	11	52.4
	7	4	19.0
	8	1	4.8
Letters frequently reversed: u - n	4	2	9.5
	5	4	19.0
	6	11	52.4
	7	3	14.3
	8	1	4.8

Descriptor	Ranking*	Frequency	Percentage
Does not stay on lines when printing	5	10	47.6
	6	11	52.4
Recognizes minimal differences in spoken words: cap - cup	1	2	9.5
	2	7	33.3
	3	7	33.3
	4	3	14.3
	6	2	9.5
Recognizes minimal differences in written words: hit - hat	1	4	19.0
	2	9	42.9
	3	6	28.6
	4	1	4.8
	6	1	4.8
Disturbs others while they are working	5	1	4.8
	6	2	9.5
	7	10	47.6
	8	8	38.1
Cooperative	1	3	14.3
	2	10	47.6
	3	6	28.6
	4	2	9.5
Disruptive in class	3	1	4.8
	5	1	4.8
	6	3	14.3
	7	9	42.9
	8	6	28.6
	9	1	4.8
Good work habits	1	7	33.3
	2	12	57.1
	3	1	4.8
	5	1	4.8
Disorganized	6	6	28.6
	7	7	33.3
	8	8	38.1
Rarely completes assignments on time	2	1	4.8
	5	1	4.8
	6	3	14.3
	7	6	28.6
	8	8	38.1
	9	2	9.5

Descriptor	Ranking*	Frequency	Percentage
Works well without adult supervision	1	9	42.9
	2	8	38.1
	3	4	19.0
Very inattentive to classroom proceedings	7	1	4.8
	8	13	61.9
	9	7	33.3
Able to begin and complete classroom tasks	1	7	33.3
	2	13	61.9
	3	1	4.8
Associates letters with their most frequent sounds	1	2	9.5
	2	10	47.6
	3	6	28.6
	4	3	14.3
Associates printed words with objects	1	5	23.8
	2	11	52.4
	3	3	14.3
	4	1	4.8
	5	1	4.8
Prints first name	2	1	4.8
	3	7	33.3
	4	12	57.1
	5	1	4.8
Counts from 1 to 10	1	1	4.8
	2	2	9.5
	3	6	28.6
	4	11	52.4
	5	1	4.8
Frequently confuses basic colors	6	9	42.9
	7	7	33.3
	8	5	23.8

* 1 = absolutely contributes to student success
2 = strongly contributes to student success
3 = moderately contributes to student success
4 = mildly contributes to student success
5 = irrelevant
6 = mildly contributes to student failure
7 = moderately contributes to student failure
8 = strongly contributes to student failure
9 = absolutely contributes to student failure

APPENDIX D

STEP 2 REFINED LIST OF STUDENT DESCRIPTORS

1. Has difficulty sitting still, may wriggle a lot or get out of seat
2. Healthy
3. Recalls details from a story
4. Bashful when meeting new children
5. Good personal hygiene
6. Has a negative attitude toward self
7. Parents are interested, supportive and concerned about child's progress in school
8. Has a positive attitude toward school and learning
9. Has colds
10. Calm
11. Confident
12. Emotionally stable and controlled
13. Child overreacts (becomes very upset) in a stressful situation
14. Extroverted, outgoing
15. Communicates using well formed complete sentences
16. Associates letters with their most frequent sounds
17. Disorganized
18. Confuses basic colors
19. Good workhabits
20. Counts correctly
21. Knows colors
22. Disturbs others while they are working

23. Cooperative
24. Disruptive in class
25. Works well without adult supervision
26. Takes a long time to become comfortable in a new situation
27. Dirty and unkempt
28. Clean and well dressed
29. Knows alphabet sounds
30. Holds pencil properly
31. Completes assignments on time
32. Inattentive to classroom proceedings
33. Enjoys books
34. Appropriate clothing
35. Prints first name correctly
36. Can associate a printed word with picture
37. Stays on line when printing
38. Verbally articulate
39. Inarticulate speech
40. Reverses letters; u - n
41. Recognizes minimal differences in spoken words; cap - cup
42. Recognizes minimal differences in written words; hit - hat
43. Copies shapes correctly
44. Neat printing
45. Able to begin and complete classroom tasks
46. Clumsy and awkward
47. Able to jump, skip and hop

48. Difficulty remembering instructions

49. Difficulty understanding instructions

50. Reproduces a spoken sentence consisting of five familiar words

51. Initiates conversation

52. Follows directions involving words like under, over, in, out, near, far, left, right

53. 5-1/2 years old when beginning first grade

54. 6.0 years old when beginning first grade

55. 6-1/2 years old when beginning first grade

56. Male

57. Female

58. Parents are professionals

59. English is a second language

60. From a single parent family

61. On social assistance

62. Younger siblings

63. Only child

APPENDIX E

STEP 2 STUDENT PROFILE DATA RECORD FORM

Name and I.D. # ______________________

Birthdate: ______________ Sex: M F

School: ______________ Date: __________

Kindergarten Teacher: ______________________

Kindergarten Teacher Comments: ______________________

____

First Grade Teacher and I.D.# ______________________

1) Parent/s are professionals Yes No
2) English is a second language Yes No
3) From a single parent family Yes No
4) On social assistance Yes No
5) Younger siblings Yes No
6) Only child Yes No

1. ______
2. ______
3. ______
4. ______
5. ______
6. ______
7. ______
8. ______
9. ______
10. ______
11. ______
12. ______
13. ______
14. ______
15. ______
16. ______
17. ______
18. ______
19. ______
20. ______
21. ______
22. ______
23. ______
24. ______
25. ______
26. ______
27. ______
28. ______
29. ______
30. ______
31. ______
32. ______
33. ______
34. ______
35. ______
36. ______
37. ______
38. ______
39. ______
40. ______
41. ______
42. ______
43. ______
44. ______
45. ______
46. ______
47. ______
48. ______
49. ______
50. ______
51. ______
52. ______
53. ______

APPENDIX F

STEP 2 FREQUENCY OF TEACHER RANKINGS OF STUDENT DESCRIPTORS

Descriptor	Ranking[a]	Frequency	Percentage
Healthy	2	5	9.4
	3	6	11.3
	4	20	37.7
	5	22	41.5
Recalls details from a story	1	5	9.4
	2	6	11.3
	3	12	22.6
	4	22	41.5
	5	8	15.1
Bashful when meeting new children	1	9	17.0
	2	17	32.1
	3	10	18.9
	4	10	18.9
	5	7	13.2
Good personal hygiene	2	2	3.8
	3	6	11.3
	4	10	18.9
	5	35	66.0
Has a negative attitude toward self	1	16	30.2
	2	17	32.1
	3	12	22.6
	4	6	11.3
	5	2	3.8
Parents are interested, supportive and concerned about child's progress in school	1	4	7.5
	2	6	11.3
	3	9	17.0
	4	10	18.9
	5	24	45.3
Has a positive attitude toward school and learning	1	1	1.9
	2	6	11.3
	3	13	24.5
	4	17	32.1
	5	16	30.2

Descriptor	Ranking[a]	Frequency	Percentage
Has colds	1	6	11.3
	2	17	32.1
	3	18	34.0
	4	10	18.9
	5	2	3.8
Calm	1	3	5.7
	2	15	28.3
	3	11	20.8
	4	17	32.1
	5	7	13.2
Confident	1	3	5.7
	2	10	18.9
	3	16	30.2
	4	16	30.2
	5	8	15.1
Emotionally stable and controlled	1	1	1.9
	2	13	24.5
	3	12	22.6
	4	18	34.0
	5	8	15.1
Child overreacts (becomes very upset) in a stressful situation	1	11	20.8
	2	16	30.2
	3	11	20.8
	4	9	17.0
	5	6	11.3
Extroverted, outgoing	1	7	13.2
	2	6	11.3
	3	10	18.9
	4	16	30.2
	5	14	26.4
Communicates using well formed complete sentences	1	6	11.3
	2	7	13.2
	3	13	24.5
	4	17	32.1
	5	10	18.9
Associates letters with their most frequent sounds	1	12	22.6
	2	10	18.9
	3	18	34.0
	4	12	22.6
	5	1	1.9

Descriptor	Ranking[a]	Frequency	Percentage
Disorganized	1	6	11.3
	2	20	37.7
	3	19	35.8
	4	6	11.3
	5	2	3.8
Confuses basic colors	1	38	71.7
	2	5	9.4
	3	6	11.3
	4	3	5.7
	5	1	1.9
Counts correctly	1	2	3.8
	2	4	7.5
	3	12	22.6
	4	6	11.3
	5	29	54.7
Knows colors	1	1	1.9
	2	1	1.9
	3	3	5.7
	4	6	11.3
	5	41	77.4
Disturbs others while they are working	1	10	18.9
	2	14	26.4
	3	11	20.8
	4	15	28.3
	5	3	5.7
Cooperative	2	9	17.0
	3	16	30.2
	4	14	26.4
	5	14	26.4
Disruptive in class	1	12	22.6
	2	12	22.6
	3	9	17.0
	4	15	28.3
	5	5	9.4
Takes a long time to become comfortable in a new situation	1	8	15.1
	2	16	30.2
	3	11	20.8
	4	11	20.8
	5	7	13.2

Descriptor	Ranking[a]	Frequency	Percentage
Dirty and unkempt	1	40	75.5
	2	5	9.4
	3	5	9.4
	4	2	3.8
	5	1	1.9
Clean and well dressed	2	2	3.8
	3	5	9.4
	4	9	17.0
	5	37	69.8
Knows alphabet sounds	1	15	28.3
	2	9	17.0
	3	15	28.3
	4	12	22.6
	5	2	3.8
Holds pencil properly	1	2	3.8
	2	4	7.5
	3	7	13.2
	4	11	20.8
	5	29	54.7
Inattentive to classroom proceedings	1	5	9.4
	2	15	28.3
	3	12	22.6
	4	16	30.2
	5	5	9.4
Enjoys books	2	3	5.7
	3	11	20.8
	4	25	47.2
	5	14	26.4
Appropriate clothing	2	3	5.7
	3	7	13.2
	4	5	9.4
	5	38	71.7
Prints first name correctly	1	3	5.7
	2	1	1.9
	3	3	5.7
	4	16	30.2
	5	30	56.6

Descriptor	Ranking[a]	Frequency	Percentage
Can associate a printed word with a picture	1	13	24.5
	2	7	13.2
	3	20	37.7
	4	9	17.0
	5	4	7.5
Stays on line when printing	1	5	9.4
	2	11	20.8
	3	28	52.8
	4	7	13.2
	5	2	3.8
Verbally articulate	1	6	11.3
	2	7	13.2
	3	10	18.9
	4	16	30.2
	5	14	26.4
Inarticulate speech	1	21	39.6
	2	15	28.3
	3	8	15.1
	4	7	13.2
	5	2	3.8
Reverses letters; u - n	1	4	7.5
	2	17	32.1
	3	22	41.5
	4	8	15.1
	5	1	1.9
Recognizes minimal differences in spoken words; cap - cup	1	4	7.5
	2	6	11.3
	3	27	50.9
	4	9	17.0
	5	7	13.2
Recognizes minimal differences in written words; hit - hat	1	3	5.7
	2	5	9.4
	3	30	56.6
	4	14	26.4
	5	1	1.9
Copies shapes correctly	2	5	9.4
	3	13	24.5
	4	25	47.2
	5	10	18.9

Descriptor	Ranking[a]	Frequency	Percentage
Neat printing	1	4	7.5
	2	15	28.3
	3	11	20.8
	4	15	28.3
	5	8	15.1
Clumsy and awkward	1	18	34.0
	2	22	41.5
	3	5	9.4
	4	6	11.3
	5	2	3.8
Able to jump, skip and hop	1	3	5.7
	2	6	11.3
	3	10	18.9
	4	14	26.4
	5	20	37.7
Difficulty remembering instructions	1	4	7.5
	2	20	37.7
	3	14	26.4
	4	12	22.6
	5	3	5.7
Difficulty understanding instructions	1	7	13.2
	2	19	35.8
	3	12	22.6
	4	11	20.8
	5	4	7.5
Reproduces a spoken sentence consisting of five familiar words	1	3	5.7
	2	3	5.7
	3	18	34.0
	4	13	24.5
	5	16	30.2
Initiates conversation	1	4	7.5
	2	7	13.2
	3	7	13.2
	4	21	39.6
	5	14	26.4

Descriptor	Ranking[a]	Frequency	Percentage
Follows directions involving words like under, over, in, out, near, far, left, right	1	4	7.5
	2	2	3.8
	3	14	26.4
	4	26	49.1
	5	7	13.2

[a] 1 = never; 5 = always

APPENDIX G

STEP 3 FIRST GRADE TEACHER PROFILE DATA

TEACHER NAME AND CODE #: ______________________________

SCHOOL: ____________________ DATE: __________

YEARS OF TEACHER TRAINING: ______________________________

YEARS OF TEACHING EXPERIENCE: ____________________________

YEARS OF GRADE ONE TEACHING EXPERIENCE: __________________

AGE: ______ SEX: __________

1. ______
2. ______
3. ______
4. ______
5. ______
6. ______
7. ______
8. ______
9. ______
10. ______
11. ______
12. ______
13. ______
14. ______
15. ______
16. ______
17. ______
18. ______
19. ______
20. ______
21. ______
22. ______
23. ______
24. ______
25. ______
26. ______
27. ______
28. ______
29. ______
30. ______
31. ______
32. ______
33. ______
34. ______
35. ______
36. ______
37. ______
38. ______
39. ______
40. ______
41. ______
42. ______
43. ______
44. ______
45. ______
46. ______
47. ______
48. ______
49. ______
50. ______
51. ______
52. ______
53. ______
54. ______
55. ______
56. ______
57. ______
58. ______
59. ______
60. ______
61. ______
62. ______
63. ______

APPENDIX H

STEP 3 FREQUENCY OF TEACHER RANKINGS OF STUDENT DESCRIPTORS

Descriptor	Ranking[a]	Frequency	Percentage
Has difficulty sitting still, may wriggle a lot or get out of seat	2	5	41.7
	3	3	25.0
	4	3	25.0
	7	1	8.3
Recalls details from a story	5	2	16.7
	6	10	83.3
Bashful when meeting new children	3	3	25.0
	4	8	66.7
	5	1	8.3
Good personal hygiene	4	6	50.0
	5	6	50.0
Has a negative attitude toward self	1	6	50.0
	2	3	25.0
	3	2	16.7
	4	1	8.3
Parents are interested, supportive and concerned about child's progress in school	5	2	16.7
	6	5	41.7
	7	5	41.7
Has a positive attitude toward school and learning	4	1	8.3
	6	3	25.0
	7	8	66.7
Has colds	2	2	16.7
	3	6	50.0
	4	4	33.3
Calm	4	4	33.3
	5	6	50.0
	6	1	8.3
	7	1	8.3

Descriptor	Ranking[a]	Frequency	Percentage
Child overreacts (becomes very upset) in a stressful situation	2	6	50.0
	3	3	25.0
	4	3	25.0
Extroverted, outgoing	4	8	66.7
	5	3	25.0
	6	1	8.3
Communicates using well formed complete sentences	4	1	8.3
	5	3	25.0
	6	7	58.3
	7	1	8.3
Disorganized	2	3	25.0
	3	8	66.7
	4	1	8.3
Confuses basic colors	2	2	16.7
	3	7	58.3
	4	3	25.0
Good workhabits	4	1	8.3
	5	1	8.3
	6	4	33.3
	7	6	50.0
Counts correctly	4	3	25.0
	5	7	58.3
	6	2	16.7
Knows colors	4	2	16.7
	5	6	50.0
	6	4	33.3
Disturbs others while they are working	2	4	33.3
	3	5	41.7
	4	3	25.0
Cooperative	4	2	16.7
	5	4	33.3
	6	4	33.3
	7	2	16.7
Disruptive in class	1	2	16.7
	2	4	33.3
	3	4	33.3
	4	1	8.3
	5	1	8.3

Descriptor	Ranking[a]	Frequency	Percentage
Takes a long time to become comfortable in a new situation	1	1	8.3
	2	1	8.3
	3	7	58.3
	4	2	16.7
	5	1	8.3
Dirty and unkempt	2	1	8.3
	3	3	25.0
	4	8	66.7
Clean and well dressed	4	8	66.7
	5	4	33.3
Knows alphabet sounds	4	1	8.3
	5	3	25.0
	6	6	50.0
	7	2	16.7
Holds pencil properly	4	6	50.0
	5	5	41.7
	6	1	8.3
Completes assignments on time	4	2	16.7
	5	3	25.0
	6	7	58.3
Inattentive to classroom proceedings	1	2	16.7
	2	8	66.7
	4	2	16.7
Enjoys books	4	1	8.3
	6	8	66.7
	7	3	25.0
Prints first name correctly	4	5	41.7
	5	5	41.7
	6	2	16.7
Verbally articulate	4	1	8.3
	5	2	16.7
	6	6	50.0
	7	3	25.0
Inarticulate speech	2	4	33.3
	3	4	33.3
	4	3	25.0
	5	1	8.3

Descriptor	Ranking[a]	Frequency	Percentage
Reverses letters; u - n	2	1	8.3
	3	4	33.3
	4	7	58.3
Recognizes minimal differences in spoken words; cap - cup	2	1	8.3
	4	1	8.3
	5	4	33.3
	6	6	50.0
Recognizes minimal differences in written words; hit - hat	4	1	8.3
	5	3	25.0
	6	6	50.0
	7	2	16.7
Copies shapes correctly	4	2	16.7
	5	8	66.7
	6	2	16.7
Neat printing	3	1	8.3
	4	7	58.3
	5	2	16.7
	6	2	16.7
Able to begin and complete classroom tasks	5	2	16.7
	6	8	66.7
	7	2	16.7
Clumsy and awkward	3	5	41.7
	4	7	58.3
Able to jump, skip and hop	4	6	50.0
	5	5	41.7
	6	1	8.3
Difficulty remembering instructions	1	1	8.3
	2	6	50.0
	3	4	33.3
	5	1	8.3
Difficulty understanding instructions	1	2	16.7
	2	7	58.3
	3	2	16.7
	5	1	8.3

Descriptor	Ranking[a]	Frequency	Percentage
Reproduces a spoken sentence consisting of five familiar words	4	1	8.3
	5	7	58.3
	6	3	25.0
	7	1	8.3
Initiates conversation	4	3	25.0
	5	6	50.0
	6	3	25.0
Follows directions involving words like under, over, in, out, near, far, left, right	4	1	8.3
	5	4	33.3
	6	6	50.0
	7	1	8.3
5-1/2 years old when beginning first grade	2	6	50.0
	3	5	41.7
	4	1	8.3
6.0 years old when beginning first grade	4	1	8.3
	5	3	25.0
	6	7	58.3
	7	1	8.3
6-1/2 years old when beginning first grade	5	3	25.0
	6	6	50.0
	7	3	25.0
Male	3	1	8.3
	4	11	91.7
Female	4	11	91.7
	5	1	8.3
Parents are professionals	4	8	66.7
	5	3	25.0
	6	1	8.3
English is a second language	3	9	75.0
	4	3	25.0
From a single parent family	3	2	16.7
	4	10	83.3
On social assistance	3	4	33.3
	4	8	66.7

Descriptor	Ranking[a]	Frequency	Percentage
Younger siblings	4	10	83.3
	5	2	16.7
Only child	3	1	8.3
	4	10	83.3
	6	1	8.3

[a] 1 = absolutely contributes to student failure

2 = strongly contributes to student failure

3 = mildly contributes to student failure

4 = does not contribute to student success or failure

5 = mildly contributes to student success

6 = strongly contributes to student success

7 = absolutely contributes to student success

APPENDIX I

STEP 4 TEACHER EVALUATION OF STUDENT ACHIEVEMENT

Student Name: ____

Teacher/s: ______________________ School: ______________________

Number of Students Referred (ie. Special Education or psychological evaluation) from this year's class ______________________

Number of Students recommended to repeat first grade from this year's class ______________________

Compared to what you feel is an average grade one student in terms of academic achievement and school functioning, complete the following rating scale for ____.

1) Sight-word vocabulary

1	2	3	4	5
very poor		average		excellent

2) Reading comprehension

1	2	3	4	5
very poor		average		excellent

3. Spelling competency

1	2	3	4	5
very poor		average		excellent

4. Listening comprehension

1	2	3	4	5
very poor		average		excellent

5. Writing skills (creative writing, sentence structure, etc.)

1	2	3	4	5
very poor		average		excellent

6. Knowledge of basic mathematics facts to 10.

1	2	3	4	5
very poor		average		excellent

7. Counting through 100 (written)

1	2	3	4	5
very poor		average		excellent

8. Adding and subtracting two digit numbers (no renaming)*

1	2	3	4	5
very poor		average		excellent

9. Development of mathematics concepts (ie. fractions, time, money, geometry, measurement).

1	2	3	4	5
very poor		average		excellent

10. Number of in-classroom friends

1	2	3	4	5
none				most of class

11. Frequency of social conflicts with peers

1	2	3	4	5
every day	often	occasionally	rarely	never

* Some teachers felt this item was inappropriate because such a skill was not in the grade one mathematics curriculum. Consequently, some teachers put NA. To ensure that the final evaluation remained out of 100, a ranking of "3" was assigned to NA on this item.

12. Happy at school

1 never 2 3 generally 4 5 always

13. Eager to learn

1 never 2 3 generally 4 5 always

14. Cooperative

1 never 2 3 generally 4 5 always

15. Attentive to classroom proceedings

1 never 2 3 generally 4 5 always

16. Complies with classroom rules

1 never 2 3 generally 4 5 always

17. To what extent do you feel that Special Education placement or intervention is necessary for ______________________?

1	2	3	4	5
absolutely essential				not necessary at all

18. To what extent do you feel ______________ would benefit from an additional year in grade one?

1	2	3	4	5
absolutely essential				absolutely unnecessary

19. to what extent do you feel that ______________ will require a modified program next year?

1	2	3	4	5
absolutely essential				absolutely unnecessary

20. In forming grade two class lists, in which reading group would you place ____________________________?

1	2	3	4	5
low reading group		average		high reading group

Thank you very much for your cooperation, time and valuable input.

Teacher Evaluation of Student Achievement Scores and Subscores

Language Arts (#'s 1, 2, 3, 4, 5)	25
Mathematics (#'s 6, 7, 8, 9)	20
Social Competence (#'s 10, 11)	10
Emotional Development (#'s 12 and 13)	10
Behavioral Compliance (#'s 14, 15, 16)	15
Teacher Recommendations (#'s 17, 18, 19, 20)	20
Total Academic Achievement (#'s 1, 2, 3, 4, 5, 6, 7, 8, 9)	45
Total Socio-Emotional-Behavioral (#'s 10, 11, 12, 13, 14, 15, 16)	35
Total Teacher Evaluation (#'s 1 through 20)	100

APPENDIX J

STEP 4 PARENTAL EVALUATION OF STUDENT PERFORMANCE

Student Name: ______________________________

School: ____________________ Teacher/s: ____________

Parent/s Name/s: ____________________________

Special Circumstances: ______________________

Telephone Number: ___________________________

Date Contacted: ________________ Comments: __________

morning
Good afternoon Mr./Mrs. ____________________.
evening

This is Genevieve Fedoruk.

I'm a student at the University of Alberta conducting research at ____________________ school. Part of my research study is concerned with parents' impressions of their childrens' school performance. Would you have a few minutes to answer some questions regarding your evaluation of ______________ performance this year in first grade? ______________________

____

____

____

____

____

____

____

1. How happy has ____________________ been this year in grade one? Very happy, quite happy, not too happy. (Discuss and assign ranking.)

1	2	3	4	5
very unhappy				very happy

2. Does ________________ really look forward to going to school, or does he/she try to avoid school by pretending he/she is sick? (Discuss and assign ranking.)

1	2	3	4	5
very avoidant				very eager

3. In your estimation, how well can _____________ read? (Discuss and assign ranking.)

1	2	3	4	5
very poorly				extremely well

4. How many friends does _____________ have in school? Very many, hardly any? (Discuss and assign ranking.)

1	2	3	4	5
none				very many

5. For a child at the end of first grade, how well can ________________ count? Very well, average, not too well? (Discuss and assign ranking.)

1	2	3	4	5
not at all	to 10	to 20	over 50	very well to 100

6. How well does ________________ get along with other children in grade one? Very well, not too well? (Discuss and assign ranking.)

1	2	3	4	5
fights a lot				never fights

7. How well is ________________ able to follow classroom rules? Does he/she speak out of turn? Does he/she have trouble staying in his/her desk? (Discuss and assign ranking.)

1	2	3	4	5
not at all				very well

8. Compared to other children in his/her classroom, can ________________ read a lot of words, an average amount or not too many words? (Discuss and ranking.)

1	2	3	4	5
reads only a few words				reads very many words

9. How well can ______________ add and subtract? Very well, not too well? (Discuss and assign ranking.)

1	2	3	4	5
not at all				very well over facts to 10

10. How satisfied are you with how much ____________ has learned this year in grade one? (Discuss and assign ranking.)

1	2	3	4	5
very unsatisfied				very satisfied

Thank you very much. Good bye.

Parental Evaluation of Student Performances Scores and Subscores	
Student Happiness (#'s 1 and 2)	___/10
Student Social Competence (#'s 4, 6 and 7)	___/15
Reading Ability (#'s 3 and 8)	___/10
Mathematics Ability (#'s 5 and 9)	___/10
Total Social-Emotional Functioning (#'s 1, 2, 4, 6 and 7)	___/25
Total Academic Achievement (#'s 3, 5, 8, 9, and 10)	___/25
Total Student Performance (#'s 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10)	___/50

APPENDIX K

TEACHERS' STANFORD ACHIEVEMENT TEST INDIVIDUAL CLASS DATA SHEET

Teacher School Date

Student First Name	Student Last Name	Read Comp Raw Score	Read Comp Gr. Equiv.	Read Comp % ile	Math Raw Score	Math Gr. Equiv.	Math % ile
Class Mean							
Class Std. Dev.							
Group Mean							
Group Std. Dev.							
Group Range							

APPENDIX L

CORRELATIONS BETWEEN TEACHER EVALUATION SCORES

	Mathematics	Social Competence	Emotional Development	Behavioral Compliance	Teacher Recommendations	Total Academic	Total Social-Emotional-Behav.	Total Evaluation
Lang Arts	.80***	.26	.39**	.39**	.84***	.96***	.25	.88***
Math		.25	.44**	.40**	.69***	.92***	.17	.86***
Soc Comp			.55***	.77***	.24	.26	.79***	.52***
Emo Dev				.59***	.35*	.44**	.71***	.57***
Beha					.26	.37*	75***	65***
Recom						.85***	.36*	.73***
Total Acad							.26	.90***
Total SEB								.38**

* $p < .05$
** $p < .01$
*** $p < .001$

NOTE: Refer to alternate axis for unabbreviated item.

APPENDIX M

CORRELATIONS BETWEEN PARENT EVALUATION SCORES

	Student Happiness	Social Competence	Reading	Mathematics	Total Social Emotional	Total Academic	Total Evaluation
STUD HAPP		.36**	-.05	-.07	.80***	.37	.52*
SOC COMP			.05	-.10	.85***	.27	.70***
READ				.53**	.007	.88***	.60***
MATH					-.08	.45**	.26
TOT SE						.19	.74***
TOT ACAD							.79***
TOT EVAL							

* $p < .05$
** $p < .01$
*** $p < .001$

NOTE: Refer to alternate axis for unabbreviated item.

APPENDIX N

ECOLOGICAL CONGRUENCE METRICS CONCEPTUAL RATIONALE AND ARITHMETIC CALCULATIONS

Ecological Congruence Metric A

Congruence Metric A involved several numerical manipulations of teacher and pupil profile data:

1. Step 2 teacher profiles were translated into a five-point scale so as to be comparable to pupil profiles which were already on a five-point scale. The following illustrates the scale translation system employed for Metric A as well as for Metrics B, C, D, E, F, and G.

    1 [1 = Absolutely contributes to student failure
    [2 = Strongly contributes to student failure

    2 [3 = Mildly contributes to student failure

    0 - 3 [4 = Does not contribute to student success or failure

    4 [5 = Mildly contributes to student success

    5 [6 = Strongly contributes to student success
    [7 = Absolutely contributes to student success

2. Four possible situations between teacher item rankings and pupil item rankings resulted in a score of zero (congruence): When both teacher and student rankings were identical (i.e., 5 and 5); when the teacher ranked an item as not contributing to success or failure; when the student was ranked higher on a desirable characteristic than the teacher ranked its contribution to success (i.e., teacher item ranked 4, student item ranked 5); and when the student scored lower on an undesirable characteristic than the teacher ranked that characteristic's contribution to failure (i.e., teacher item ranked 2, student item ranked 1).

3. Age, gender, and yes-no response items were translated into either 5 (yes) or 1 (no) so as to be comparable with teacher ranking of those 11 student descriptors.

4. Absolute values of the differences between the 63 corresponding teacher-student descriptor pairs were summed. The following provides a segment of actual data which illustrates calculations for Ecological Congruence Metric A as well as Metric B which is subsequently discussed.

4 5 5 0 5 0 4 1 1 5 5 4 2

3 4 2 2 2 5 1 2 5 5 5 5 1

1+1+3+0+3+0+3+1+4+0+0+0+0 = 16

Thus, the larger the number the greater the disparity between teacher and pupil profiles; the smaller the number the more congruent the profiles. Theoretically, teacher-student pairs could have Ecological Congruence Metric A scores of 0 (no discordance on any pair of items) to 252 (maximum discordance on each pair of items or 4 X 63). The smaller the score, the greater the congruence between teacher rankings of student descriptors and actual pupil ratings on those same descriptors.

Ecological Congruence Metric B

There was considerable variability across teachers in terms of number of descriptors ranked as not contributing to student success or failure (range 7 to 49). It was reasoned that this variability may differentially affect pupil-teacher compatibility, and that it should, therefore, be incorporated in an ecological congruence metric. Consequently, Metric B divided Metric A by the number of items ranked by the teacher as contributing to student success or failure. Thus;

$$\text{Metric B} = \frac{\text{Metric A}}{63 - \text{number of teacher 0 ranked items}}$$

Ecological Congruence Metric C

Reasoning that the 11 age, gender, and yes-no response items were in some respects different from the 52 ranked descriptors, all subsequent metrics evaluated congruence only in terms of ranked descriptors. Also, it was suspected that using a combination of both desirable and undesirable student attributes may in some way influence ecological congruence calculations. Thus, all negative student descriptors (17/52) were inverted so that a ranking of "1" always indicated undesirable student characteristics and a ranking of "5" always indicated desirable student characteristic. Using only ranked and inverted student items, Ecological Congruence Metric C assumed that the number of negative differences between each teacher ranked item and its corresponding student profile item numerically represented a conceptualization of pupil-teacher profile fit. With inverted student data, such a number would summarize instances in which the student was ranked higher on one item than the teacher felt that attribute contributed to success or failure. Thus;

Metric C = number of negative differences between teacher-pupil profile item pairs using inverted student data

Ecological Congruence Metric D

As with Metric C, the 17 negative student descriptors were inverted for Ecological Congruence Metric D. It was reasoned that the number of positive differences between each teacher ranked descriptor and the corresponding student item numerically represented an aspect of pupil-teacher profile compatibility. Such a number would summarize the number of cases in which the student was ranked lower on an item than the teacher ranked that descriptor as contributing to success or failure. Thus;

Metric D = number of positive differences between teacher-pupil profile item pairs using inverted student data

Ecological Congruence Metric E

Instead of merely counting the number of negative differences between teacher ranked items and corresponding student items as was the case with Ecological Congruence Metric C, it was reasoned that summing negative differences would provide an index of the extent to which students were "better" than their teachers could "tolerate". Thus;

Metric E = sum of negative differences between teacher-pupil profile item pairs using inverted student data

Ecological Congruence Metric F

Similarly, instead of simply counting the number of positive differences between each teacher ranked descriptor and its associated student profile descriptor as was the case with Metric D, it was suspected that adding these positive differences could provide a numerical representation of the extent to which pupils were "worse" than their first grade teachers could "tolerate". Thus;

Metric F = sum of positive differences between teacher-pupil profile item pairs using inverted student data

Ecological Congruence Metric G

We wondered if items in which students were better than their teachers could tolerate (Metric E) might somehow compensate for items in which students were worse than their teachers could tolerate (Metric F). Treating all 52 descriptors equally, Metric G summed positive and negative profile item pair differences. Thus;

Metric G = total of signed differences between teacher-pupil profile item pairs using inverted student data

Ecological Congruence Metric H

Reasoning that teacher rankings of "mildly contributes to student success" and "mildly contributes to student failure" may be relatively inconsequential, a second teacher ranking scale translation system was devised. Original seven-point scale teacher profiles were translated into five-point scales so as to be comparable to student profiles which had always been on a five-point scale. The following illustrates this second translation system which collapsed the three middle rankings for teachers.

1 1 = Absolutely contributes to student failure

2 2 = Strongly contributes to student failure

[3 = Mildly contributes to student failure
3 [4 = Does not contribute to student success or failure
[5 = Mildly contributes to student success

4 6 = Strongly contributes to student success

5 7 = Absolutely contributes to student success

Suspecting that previously inverted student data, while more meaningful, may camouflage instances of teacher-pupil profile item discordance, student profiles were returned to their original order. When comparing teacher-pupil profile fit, a teacher ranking of "3" was interpreted as tolerance of a descriptor and therefore a match with the corresponding pupil item, regardless of pupil ranking. Pupil profile item rankings were subtracted from corresponding teacher profile item rankings of 1, 2, 4, and 5. Absolute differences between teacher and student item rankings were greater than one to contribute to discordance. Minor differences, differences of only one, between teacher rankings of items and student ratings on those same items, it was reasoned, could not be construed as mismatches between teacher preferences and student characteristics. The following provides an actual segment of arithmetic calculations which occurred for Ecological Congruence Metric H as well as all subsequent congruence metrics.

$$\begin{array}{ccccccccccccc}
4 & 4 & 2 & 3 & 3 & 5 & 2 & 3 & 5 & 4 & 4 & 3 & 4 \\
2 & 2 & 5 & 5 & 4 & 3 & 4 & 1 & 2 & 1 & 5 & 5 & 3 \\
\hline
+2 & +2 & -3 & 0 & 0 & +2 & -2 & 0 & +3 & +3 & 0 & 0 & 0
\end{array}$$

Ecological Congruence Metric H assumed the number of positive differences between teacher ranked items and corresponding student rated descriptors could numerically represent a conceptualization of pupil-teacher profile fit. With original order student data, such a number would represent a combination of situations in which students were ranked lower than the extent to which their teachers felt the attribute contributed to success or failure. Thus;

Metric H = number of positive differences between teacher-pupil profile item pairs with collapsed teacher data

Ecological Congruence Metric I

Instead of simply counting the number of positive differences between each teacher ranked descriptor and its associated student profile descriptor rating, as was the case with Metric H, it was suspected that summing these positive differences could provide a numerical representation of the extent to which students were rated lower on descriptors than their first grade teachers perceived the educational impact of those descriptors. Thus;

Metric I = sum of positive differences between teacher-pupil profile item pairs using collapsed teacher data

Ecological Congruence Metric J

Ecological Congruence Metric J assumed the number of negative differences between teacher rankings of items and student ratings on associated items could represent a numerical conceptualization of pupil-teacher profile compatibility. Using original order student data, such a number would represent a combination of situations in which students were ranked higher than the extent to which their teachers felt attributes contributed to success or failure. Thus;

Metric J = number of negative differences between teacher-pupil profile item pairs using collapsed teacher data

Ecological Congruence Metric K

Rather than merely count the number of negative differences between collapsed teacher item rankings and corresponding student item ratings which treated all differences as equally important, it was reasoned a summation of these differences would proportionately reflect both large and small instances of disparity. Thus;

Metric K = sum of negative differences between teacher-pupil profile item pairs using collapsed teacher data

Ecological Congruence Metric L

Because the dynamics and mechanics of ecological congruence were not clear, an index of all possible instances of teacher-pupil profile disparity seemed necessary. It was wondered if perhaps child characteristics, even if of a positive nature, when in excess of teacher requirements, may result in discordance. Let us suppose, for example, a teacher ranked the student descriptor "verbally articulate" as mildly contributing to student success. Let us also suppose that a first grade student was rated as "always" verbally articulate. In such a case, the student was rated higher on a positive descriptor than the teacher rated that descriptor contribution to academic success. Is it possible, however, that the teacher in question may not prefer nor require students who were "always" verbally articulate? Is it possible that this interaction of teacher requirement and student attribute may be an instance of discordance? Since we were so unsure of what contributed to teacher-pupil congruence and what contributed to teacher-pupil discordance, it was reasoned that a metric of all instances of teacher-pupil profile item disparity, both positive and negative, should be developed. Thus;

Metric L = number of positive + number of negative differences between teacher-pupil profile item pairs using collapsed teacher data

Ecological Congruence Metric M

We wondered if items in which students were rated higher (Metric J) might somehow compensate for items in which students were rated lower than teachers perceived descriptor relationship to academic success or failure (Metric H). Thus;

Metric M = total of signed differences between teacher-pupil profile item pairs using collapsed teacher data

Ecological Congruence Metric N

Since it was not clear if instances where students were rated higher compensated for instances where students were rated lower than teachers perceived that attribute's impact on school performance, and since it was possible that all instances of item disparity contributed to student-teacher incompatibility, a metric which summed all instances of acute ranking differences was developed. Thus;

Metric N = summation of absolute differences between teacher-pupil profile item pairs using collapsed teacher data